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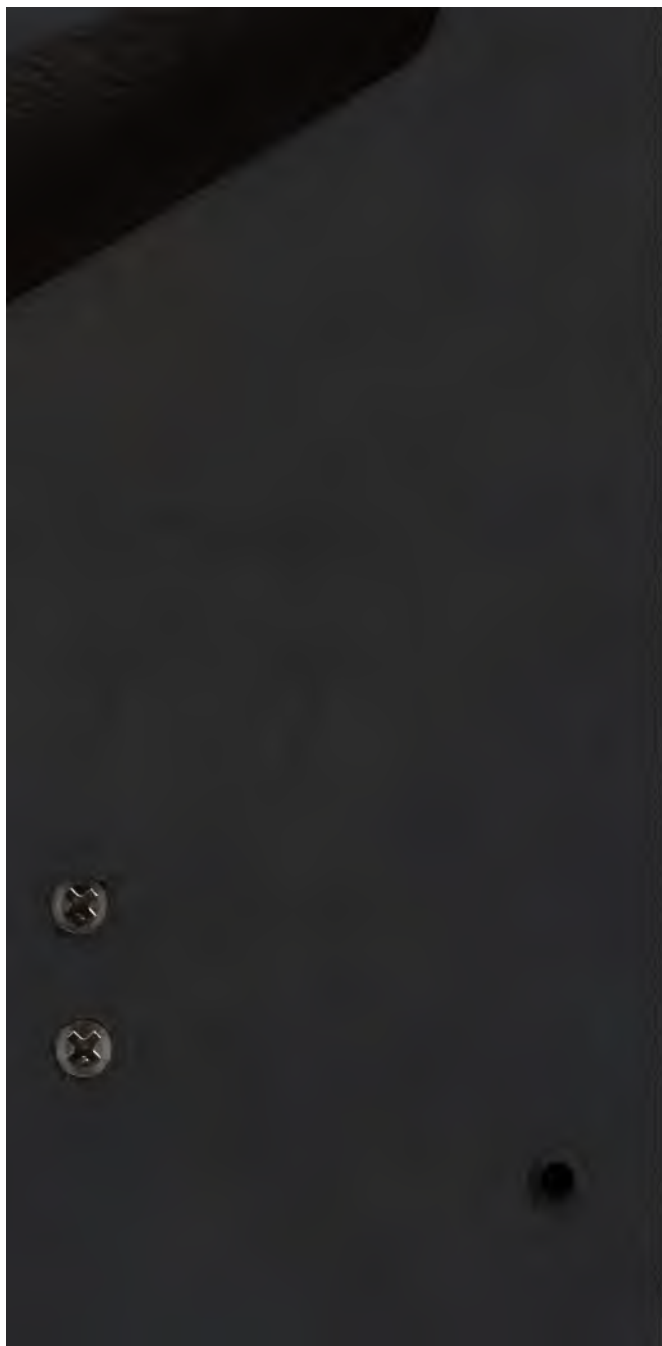
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THE CRITTENDEN  
COMMERCIAL ARITHMETIC  
AND  
BUSINESS  
MANUAL.



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◦ THE  
CRITTENDEN  
COMMERCIAL ARITHMETIC  
AND  
**Business Manual.**

DESIGNED FOR USE IN  
COUNTING-HOUSES,  
ACADEMIES, AND COMMERCIAL COLLEGES.

BY  
JOHN GROESBECK,  
CONSULTING ACCOUNTANT,  
PRINCIPAL OF THE CRITTENDEN PHILADELPHIA COMMERCIAL COLLEGE, AND AUTHOR  
OF "GROESBECK'S SERIES OF PRACTICAL BOOK-KEEPING," ETC.

*REVISED EDITION.*



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IN TWO VOLUMES, VIZ.:

1. **SCHOOL EDITION.** For Schools and Academies.
2. **COLLEGE EDITION.** For Commercial Schools and Academies.

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## PREFACE.

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**A** KNOWLEDGE of the calculations required in business, and of the best methods of performing them, is a qualification that should be possessed by every business man. Without it much time and labor are lost, and profitable operations are hindered or not undertaken. Fortunes have been made through skill in calculation, while bankruptcy, in not a few cases, has been caused by the want of it.

This skill in calculation, so much needed, can be, and should be, acquired before entering upon the duties of active life. The exactions of business leave little opportunity to remedy deficiencies of preparation, and he who goes into business uneducated must, in most cases, suffer from mental poverty ever after. Multitudes have remained in inferior positions all their lives for want of qualifications which they could have gained in a few weeks, or months at most, under competent instruction.

In the following pages the object has been to present only what is of practical value, and enough for any one

who understands the elementary rules to obtain all that is required for business purposes. The puzzles and riddles which are found in many arithmetics, are omitted because they are considered no more conducive to mental discipline than exercises on the flying trapeze are to skilful work in the useful arts. Threading the intricate labyrinths of ancient ruins teaches little of modern methods of travel, and chaff is not wanted when substantial supplies are abundant. It is believed that problems such as occur in real life will do more to invigorate and develop the mental powers and to impart ability in actual operations than mere perplexity over imaginary difficulties, to say nothing of increased dexterity from properly directed practice. Adroitness in untying knots is less useful than skill that is required in daily duties.

To acquire the readiness, rapidity, and accuracy that are demanded in business affairs, the rules and processes should be so fully mastered that they can be applied to practical matters easily and without hesitation. Bungling and tedious delays must especially be avoided. To this end familiarity with processes is requisite to the minutest detail. Without it, general theory halts and blunders in application. A mechanic will not be tolerated who can only talk about squares and circles, and is unable to do his work in a finished and expeditious manner. Much of the deficiency in reasoning power arises from a deficiency of thoroughness in elements and principles that can easily be understood; and one secret of good thinking is to have a foundation of thorough knowledge.

In addition to the rules involved in most calculations, the labor-saving methods employed by experts, and in the best business houses, are here given; so that the students who fully understand them may become, as nearly as possible, the equals of those who have acquired them in the course of a long apprenticeship in the counting-house.

The forms, nature, and uses of the large variety of business papers constitute an essential part of what every student of book-keeping and every business man should be familiar with. These forms are here given, with explanations to aid the inexperienced in such things as most frequently occur in business practice.

That what is here presented is of a practical character, and adapted to the requirements of those engaged in business pursuits, is shown by the numerous letters of commendation received from leading educators and business men in all parts of the country; and also by the fact that seventy thousand copies of the previous editions have been published—a larger number than has been sold of all other Commercial Arithmetics combined.

If “imitation is sincerest flattery,” then this work has been sincerely and extensively flattered, for several portions of its contents, taken without credit, have been set forth with much flourish in various publications.

The author has been connected with the Crittenden Philadelphia Commercial College for more than twenty-five years; he has also had a varied experience in the counting-house and in business affairs; and in his office, as consulting accountant, in a large city, has been called upon to adjust

many matters of a complicated and perplexing nature. In this way he has become acquainted with the wants of the student and of the business man, and has noted what difficulties are most frequently encountered, and what is most useful and important to be known. He has also been aided by friends, including numerous merchants, bankers, manufacturers, and officers of the Mint, Custom-house, and other institutions; and to them he returns his sincere thanks, and acknowledges his indebtedness for opportunities of obtaining valuable and authentic information. For the many kind words received, the author would also express his gratitude, and he renews the invitation to teachers, business men, and others to communicate any facts, methods, criticisms, or suggestions that will make the book more valuable or add to its accuracy and completeness.

PHILADELPHIA, 1882.





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# CHARACTERS AND ABBREVIATIONS

## USED IN BUSINESS.

|   |   |  |
|---|---|--|
| @   | At.   | 7 × 9, or 7 by 9 in. 7 in. wide, 9 in. long. |
| %   | Account.  | A 1.....First class.                         |
| ¢   | Cents.  | Acct.....Account.                            |
| %   | Per cent.   | Adv.....Adventure.                           |
| #   | Number.   | Agt.....Agent.                               |
| <sup>1</sup> / <sub>4</sub>   | One and one-quarter.  | Amt.....Amount.                              |
| <sup>1</sup> / <sub>2</sub>   | One and one-half.   | Ass'd.....Assorted.                          |
| <sup>3</sup> / <sub>4</sub>   | One and three-quarters.   | B. B.....Bill-book.                          |
| ✓   | Check mark.   | Bal.....Balance.                             |
| ×   | By, as 14 × 18 inches.  | Bbl.....Barrel.                              |
| \$  | Dollars.  | Bdls.....Bundles.                            |
| £   | Pound sterling.   | Bgs.....Bags.                                |
| 6/3.  | English shillings and pence are frequently written in this manner, the shillings on the left of the sloping line, and the pence on the right, the above meaning, 6 shillings and 3 pence. | Bkts.....Baskets.                            |
| May 18/21.  | The day of maturity as expressed in a note and the last day of grace are indicated by writing the first on the left and the second on the right of the sloping line.                      | Blk.....Black.                               |
| 15 doz. <sup>1</sup> / <sub>2</sub> , <sup>1</sup> / <sub>3</sub> , <sup>1</sup> / <sub>4</sub> , <sup>1</sup> / <sub>5</sub> . | Fifteen doz., 5 of which are \$12 per doz., 5 doz. @ \$15, and 5 doz. at \$18 per doz.  | Bls.....Bales.                               |
| 1100  | 1100 pounds gross   | Bot.....Bought.                              |
| hhd.  | Sugar. weight, 155 lbs. tare, or weight of hhd., 155 945 lbs., 945 lbs. net weight.   | B. L. or B. of L.....Bill of Lading.         |
| 42  | The numbers in the bracket are the number of yds. in each piece respectively.   | Bills Pay.....Bills payable.                 |
| 36  |   | Bills Rec.....Bills receivable.              |
| 28  |   | Bnk.....Bank.                                |
| 32  |   | Brot.....Brought.                            |
| 4 ps.   | 138 yds.  | Bque.....Barque.                             |
|   |   | Br.....Brig.                                 |
|   |   | Bus.....Bushels.                             |
|   |   | Bxs.....Boxes.                               |
|   |   | C.....Cents.                                 |
|   |   | C or centum.....Hundred.                     |
|   |   | C. B.....Cash-book.                          |
|   |   | Ck.....Check.                                |
|   |   | Cap.....Capital.                             |
|   |   | Co.....Company.                              |
|   |   | C. O. D.....Collect on delivery.             |
|   |   | Col'd.....Colored.                           |
|   |   | Cr.....Creditor.                             |
|   |   | Com.....Commission.                          |
|   |   | Cons't.....Consignment.                      |
|   |   | Cs.....Cases.                                |
|   |   | Cwt.....Hundred-weight.                      |
|   |   | C/o.....Care of.                             |
|   |   | d.....Pence.                                 |
|   |   | Dft.....Draft.                               |
|   |   | Div.....Dividend.                            |
|   |   | Disct.....Discount.                          |
| W. W., and similar characters and letters, are placed on packages to designate a particular lot or shipment.                    |   |  |
| (Goods are numbered and marked, that they may be distinguished without minute description.)                                     |   |  |

|                                    |                                 |
|------------------------------------|---------------------------------|
| Do. or Ditto...The same.           | No..... Number.                 |
| Doz.....Dozen.                     | N. P..... Notary public.        |
| Dr.....Debtor.                     | O. I. B.....Outward invoice-    |
| Ds.....Days.                       | book.                           |
| Ea.....Each.                       | Oz.....Ounces.                  |
| E. E.....Errors excepted.          | Paym't.....Payment.             |
| E. & O. E.....Errors and omissions | Pd.....Paid.                    |
| excepted.                          | Pkgs.....Packages.              |
| Eng.....English.                   | Pr. or Per.....By.              |
| Ent'd.....Entered.                 | Per cent.....By the hundred.    |
| Ex.....Without, as ex-divi-        | Pp.....Pages.                   |
| dend.                              | Pr.....Pair.                    |
| Exch.....Exchange.                 | Prem.....Premium.               |
| Exps.....Expenses.                 | Prox. (Proximo) The next month. |
| Emb'd.....Embroidered.             | Ps.....Pieces.                  |
| Fig'd.....Figured.                 | Pts.....Pints.                  |
| Fir.....Firkin.                    | Qr.....Quarter.                 |
| F. o. b.....Free on board.         | Qts.....Quarts.                 |
| Fol.....Folio.                     | Qtls.....Quintals.              |
| F'wd or forw'd Forward.            | Rec'd.....Received.             |
| Fr.....From or French.             | Recpt.....Receipt.              |
| Fc.....Franc.                      | R. R.....Railroad.              |
| Ft.....Feet.                       | Ra. or Rls.....Reals.           |
| Gal.....Gallon.                    | R. W.....Regular way.           |
| Gro.....Gross.                     | s.....Shilling.                 |
| Guar.....Guarantee.                | Shipt.....Shipment.             |
| Hdkf.....Handkerchief.             | Shs.....Shares.                 |
| Hhd.....Hogshead.                  | Schr.....Schooner.              |
| Hund.....Hundred.                  | S. S.....Steamship.             |
| I. B.....Invoice-book.             | Sq.....Square.                  |
| In. or ".....Inches.               | Stor.....Storage.               |
| Ins.....Insurance.                 | Stb't.....Steamboat.            |
| Insol.....Insolvency.              | Sunds.....Sundries.             |
| Inst. (Instant) This month.        | Super.....Superfine.            |
| Int.....Interest.                  | Str.....Steamer.                |
| Inv.....Invoice.                   | Tcs.....Tierces.                |
| Inv't'y.....Inventory.             | Ult. (Ultimo) The last month.   |
| I. O. U.....I owe you.             | Ves.....Vessels.                |
| Lbs.....Pounds.                    | Vs.....Against.                 |
| M.....Thousand.                    | Viz.....Namely.                 |
| Mdse.....Merchandise.              | Wt.....Weight.                  |
| Mo.....Month.                      | W. I.....West Indies.           |
| Mols.....Molasses.                 | Yds.....Yards.                  |
| M. t.....Empty.                    | Yr.....Year.                    |
| Net.....Without deduction.         |                                 |

*" Knowledge is the guide of practice."*

*"If a man's wits be wandering, let him study arithmetic."*—BACON.

*"He that is ignorant of arithmetic is but half a man."*—ARCHIMEDES.

*"Washington studied the intricate forms of business. He copied out bills of exchange, notes of hand, bills of sale, receipts, and all the varieties of the class, with a precision and elegance that were remarkable."*



# COMMERCIAL ARITHMETIC.



## METHODS OF ADDITION.

1. Addition constitutes the greater part of all the calculations of business life, and rapidity and accuracy in this not only facilitates progress in the more advanced computations, but is of more practical utility than in all the other arithmetical operations combined.

2. The ability to add, as some do, two, three, or more columns of figures at a time readily and with comparative ease, is the result of familiarity with combinations of numbers, the exercise of memory, and proper methods of practice.

3. Familiarity with the totals of combinations of numbers lessens the number of mental operations to be performed, and thus promotes rapidity. The combinations should be so familiar that their totals can be read off at a glance, in the same manner that a word is pronounced without naming the letters separately that compose it. A person familiar with the combination  $9 + 8 + 9$  will say 26, on seeing it, just as readily as another will say that the sum of 2 and 2 is 4.

4. The combinations which make *tens* are, perhaps, more easily learned at first, but others can soon be acquired, until those containing several figures will offer little difficulty.

5. When a figure is repeated several times, it can be multiplied by the number of times it occurs, instead of adding each figure separately.

6. When an odd number of figures occur in regular order, as,

3, 4, 5, or 2, 3, 4, 5, 6, the product of the middle figure multiplied by the number of figures will give their sum, as in the above  $4 \times 3 = 12$ ,  $4 \times 5 = 20$ .

7. Everything that encumbers the mind unnecessarily should be avoided. The repeating of numbers either mentally or aloud, as in saying 4 and 5 are 9, 9 and 7 are 16, etc., is a hindrance; it is quite as easy, and considerably quicker, to say at once 4, 9, 16, etc.

8. If the columns are long, the figures, to be carried, should be set down, so that if interruptions occur, any column may be readed without the trouble of readding the preceding.

9. The figure to be carried should always be added on commencing the next column.

10. The following methods of retaining the carrying figure are adopted by most accountants :

## FIRST METHOD.

```

$13213.30
 25342.13
 12468.31
  1143.13
 35321.34
 13476.21
  2113.13
-----
103077.55
 2222.11

```

## SECOND METHOD.

```

          15
          15
          27
          27
          20
          23
          10
-----
103077.55

```

In the first method, the figure to be carried is written *small* immediately under the figure to which it belongs.

In the second method, the whole result of each column is set down by itself, the sum of each column being written one place to the left, under the sum of the column preceding it; then, when all the results are written, the right-hand figures, including all the footing of the last column, will give the total result.

11. If the columns of figures are long, it is generally better to place the footings on a separate paper or in pencil, and test their correctness, before placing them in ink on the book, as mistakes can then be corrected without defacing the page by erasures.

12. Habits of accurate thinking should be cultivated, so that the mind will rest with certainty on the results of its exercises. Some form such habits of loose thinking, that they are undecided as to the correctness of their addition even after numerous repetitions. In most cases, however, to insure accuracy, the addition should be performed twice—in different directions. This gives new combinations, and, if there has been a mistake, is a preventive of its repetition, which is likely to occur, especially when the mind has been too long engaged with one subject.

13. In writing numbers, care should be taken to make the figures clear and plain, so that a 3 will not be mistaken for a 5, or a 7 for a 9; and also that the figures in one line do not run into those in the line below, and that all the figures of a column be placed directly under each other.

14. If the figures are not set down in regular order under each other, instead of trying to follow the column upward, take the figure which is the same number of places from the right hand as the figure with which you started, not regarding whether it is below tens or hundreds, or very near the right-hand figure, or at some distance from it. For instance, if you wish to add a column of hundreds which has been set down irregularly, instead of looking for the next figure above, look for the next figure which is three places from the right. This method will save time and avoid perplexity and uncertainty.

15. The following comprises all the combinations which include two only of the nine digits.

|  |  |  |  |   |
|--|--|--|--|---|
| $\begin{array}{r} 1 \\ 1 \\ \hline 2 \end{array}$  | $\begin{array}{r} 2 \\ 1 \\ \hline 3 \end{array}$  | $\begin{array}{r} 3 \ 2 \\ 1 \ 2 \\ \hline 4, \ 4 \end{array}$                               | $\begin{array}{r} 4 \ 3 \\ 1 \ 2 \\ \hline 5, \ 5 \end{array}$ | $\begin{array}{r} 5 \ 4 \ 3 \\ 1 \ 2 \ 3 \\ \hline 6, \ 6, \ 6 \end{array}$ |
| $\begin{array}{r} 6 \ 5 \ 4 \\ 1 \ 2 \ 3 \\ \hline 7, \ 7, \ 7 \end{array}$                                | $\begin{array}{r} 7 \ 6 \ 5 \ 4 \\ 1 \ 2 \ 3 \ 4 \\ \hline 8, \ 8, \ 8, \ 8 \end{array}$     | $\begin{array}{r} 8 \ 7 \ 6 \ 5 \\ 1 \ 2 \ 3 \ 4 \\ \hline 9, \ 9, \ 9, \ 9 \end{array}$     |  |   |
| $\begin{array}{r} 9 \ 8 \ 7 \ 6 \ 5 \\ 1 \ 2 \ 3 \ 4 \ 5 \\ \hline 10, \ 10, \ 10, \ 10, \ 10 \end{array}$ | $\begin{array}{r} 9 \ 8 \ 7 \ 6 \\ 2 \ 3 \ 4 \ 5 \\ \hline 11, \ 11, \ 11, \ 11 \end{array}$ | $\begin{array}{r} 9 \ 8 \ 7 \ 6 \\ 3 \ 4 \ 5 \ 6 \\ \hline 12, \ 12, \ 12, \ 12 \end{array}$ |  |   |

|          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <u>9</u> | <u>8</u> | <u>7</u> | <u>9</u> | <u>8</u> | <u>7</u> | <u>9</u> | <u>8</u> | <u>9</u> | <u>8</u> | <u>9</u> | <u>8</u> |
| <u>4</u> | <u>5</u> | <u>6</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>6</u> | <u>7</u> | <u>7</u> | <u>8</u> | <u>8</u> | <u>9</u> |
| 13,      | 13,      | 13       | 14,      | 14,      | 14       | 15,      | 15       | 16,      | 16       | 17       | 18       |

## Combinations from 11 to 19.

|           |           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <u>11</u> | <u>11</u> | <u>11</u> | <u>11</u> | <u>11</u> | <u>11</u> | <u>11</u> | <u>11</u> | <u>11</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 22,       | 23,       | 24,       | 25,       | 26,       | 27,       | 28,       | 29,       | 30        |
| <u>12</u> | <u>12</u> | <u>12</u> | <u>12</u> | <u>12</u> | <u>12</u> | <u>12</u> | <u>12</u> | <u>12</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 23,       | 24,       | 25,       | 26,       | 27,       | 28,       | 29,       | 30,       | 31        |
| <u>13</u> | <u>13</u> | <u>13</u> | <u>13</u> | <u>13</u> | <u>13</u> | <u>13</u> | <u>13</u> | <u>13</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 24,       | 25,       | 26,       | 27,       | 28,       | 29,       | 30,       | 31,       | 32        |
| <u>14</u> | <u>14</u> | <u>14</u> | <u>14</u> | <u>14</u> | <u>14</u> | <u>14</u> | <u>14</u> | <u>14</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 25,       | 26,       | 27,       | 28,       | 29,       | 30,       | 31,       | 32,       | 33        |
| <u>15</u> | <u>15</u> | <u>15</u> | <u>15</u> | <u>15</u> | <u>15</u> | <u>15</u> | <u>15</u> | <u>15</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 26,       | 27,       | 28,       | 29,       | 30,       | 31,       | 32,       | 33,       | 34        |
| <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 27,       | 28,       | 29,       | 30,       | 31,       | 32,       | 33,       | 34,       | 35        |
| <u>17</u> | <u>17</u> | <u>17</u> | <u>17</u> | <u>17</u> | <u>17</u> | <u>17</u> | <u>17</u> | <u>17</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 28,       | 29,       | 30,       | 31,       | 32,       | 33,       | 34,       | 35,       | 36        |
| <u>18</u> | <u>18</u> | <u>18</u> | <u>18</u> | <u>18</u> | <u>18</u> | <u>18</u> | <u>18</u> | <u>18</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 29,       | 30,       | 31,       | 32,       | 33,       | 34,       | 35,       | 36,       | 37        |
| <u>19</u> | <u>19</u> | <u>19</u> | <u>19</u> | <u>19</u> | <u>19</u> | <u>19</u> | <u>19</u> | <u>19</u> |
| <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | <u>17</u> | <u>18</u> | <u>19</u> |
| 30,       | 31,       | 32,       | 33,       | 34,       | 35,       | 36,       | 37,       | 38        |



## COUNTING-HOUSE DRILL TABLES.

Drill Table No. 1.

|    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|
| 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 |
| 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  | 9  |
| 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  | 8  |
| 7  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 7  | 7  |
| 6  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 6  | 6  |
| 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  |
| 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  | 4  |
| 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  |
| 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  |
| 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 |

The columns of the Drill Tables as well as the combinations should be added until the addition can be performed easily and without hesitation. After they have been fully mastered, other combinations containing several tens can be added with comparative ease.

It will be noticed that each column in the Drill Tables is arranged so as to give combinations different from either of the others. For additional practice, the numbers in the combinations may be inverted, or read across or up and down the page.

16. In the columns with brackets on the next page add all the figures enclosed in each bracket as *one number*, and name only results in the same manner as when the figures are taken separately. Thus, in adding column No. 4, say 7, 11, 16, &c.

Drill Table No. 2.

|    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 |
| 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 |
| 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 |
| 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 |

| (1.)        | (2.)         | (3.)          | (4.)        |
|-------------|--------------|---------------|-------------|
| 324         | 678          | 3 } 3 4       | 1 } 1 2 }   |
| 235         | 789          | 3 } 4 } 5     | 1 } 2 } 3 } |
| 143         | 976          | 4 } 6 } 3 }   | 2 } 6 } 4 } |
| 421         | 899          | 3 } 7 } 7 }   | 4 } 1 } 1 } |
| 312         | 989          | 7 } 8 } 4 }   | 2 } 5 } 5 } |
| 234         | 988          | 4 } 6 } 6 }   | 3 } 1 } 2 } |
| 343         | 878          | 2 } 8 } 1 }   | 5 } 3 } 3 } |
| 423         | 673          | 8 } 3 } 7 }   | 3 } 2 } 4 } |
| 225         | 789          | 2 } 9 } 3 }   | 2 } 6 } 5 } |
| 123         | 968          | 3 } 0 } 5 }   | 2 } 8 } 1 } |
| 334         | 887          | 4 } 5 } 5 }   | 0 } 4 } 4 } |
| 212         | 987          | 5 } 5 } 1 }   | 1 } 2 } 2 } |
| 324         | 798          | 2 } 3 } 9 }   | 0 } 4 } 1 } |
| 123         | 976          | 3 } 7 } 5 }   | 1 } 2 } 1 } |
| 431         | 687          | 7 } 6 } 5 }   | 2 } 0 } 4 } |
| 212         | 997          | 3 } 4 } 2 }   | 4 } 1 } 3 } |
| <u>4419</u> | <u>13959</u> | <u>72 1 2</u> |             |

## Addition of Several Columns at One Operation.

17. To add two or more columns at one operation.

To the lower number add first the units of the next number above, then the tens, then the hundreds; and so continue.

| 23  | OPERATION.                                |
|-----|---|
| 31  | $22 + 5 = 27, 27 + 10 = 37$               |
| 24  | $37 + 4 = 41, 41 + 20 = 61$               |
| 15  | $61 + 1 = 62, 62 + 30 = 92$               |
| 22  | $92 + 3 = 95, 95 + 20 + 115 \text{ Ans.}$ |
| 115 |   |

| 234  | OPERATION.   |
|------|--|
| 112  | $322 + 3 = 325, 325 + 20 = 345, 345 + 400 = 745$               |
| 423  | $745 + 2 = 747, 747 + 10 = 757, 757 + 100 = 857$               |
| 322  | $857 + 4 = 861, 861 + 30 = 891, 891 + 200 = 1091 \text{ Ans.}$ |
| 1091 |  |

Practice will enable a person to add amounts of two or more figures at one operation: thus,  $22 + 15 = 37$ ,  $37 + 24 = 61$ ,  $61 + 31 = 92$ ,  $92 + 23 = 115 \text{ Ans.}$  As soon as the combinations become familiar, addition by this method can be performed without difficulty; but, for ordinary purposes, one column at a time is sufficient. In Ledger accounts, when the last two or three columns are not all filled, they may be added at one operation with advantage.

18. Very long columns of figures are sometimes added in the following manner:—

## FIRST METHOD.

$$\begin{array}{r}
 247 \\
 362 \\
 228 \\
 436 \\
 \hline
 1273 \\
 128 \\
 326 \\
 121 \\
 \hline
 1848 \\
 121 \\
 316 \\
 405 \\
 \hline
 2690 \text{ Ans.}
 \end{array}$$

## SECOND METHOD.

$$\begin{array}{r}
 247 \\
 362 \\
 228 \\
 436 \quad 1273 \\
 \hline
 128 \\
 326 \\
 121 \quad 575 \\
 \hline
 121 \\
 316 \\
 405 \quad 842 \\
 \hline
 2690 \text{ Ans.}
 \end{array}$$

## Adding Horizontally.

19. In some branches of business the ability to add numbers which are written horizontally instead of being placed under each other, is often required. Thus,—

$$824 + 325 + 652 = 1801$$

All the units are first added, then the tens, and then the hundreds. A little practice will soon overcome any difficulty which may be experienced at first.

Add 16, 32, 47, 189, 228.

Add 434, 216, 4217, 3217.

Add 216, 1231, 432, 1800, 2167.

Add the following numbers as they stand:—

$$\begin{array}{r} 325 \quad 116 \quad 365 \\ 431 \quad 275 \quad 218 \quad \text{Ans. } 1730. \end{array}$$

What is the footing of the following Bill?

*Philadelphia, Nov. 15, 1882.*

*Mr. Lansing W. Parker*

*Bought of Morton, Howell & Co.*

---

|  |  |
|--|--|
| 48 yds. Irish Linen, @ 45 $\frac{1}{2}$ c. . . . .                                     |  |
| 3 Pieces French Merino, 62, 51, 57 =   |  |
| 170 yds., @ 95 c. . . . .  |  |
| 1 lb. Soda, 60 c.; 1 Bag Salt, 45 c.   |  |
| 12 lbs. Sugar, @ 10 c., 1.20; 3 lbs. Currants @ 25 c., 75 c.; . . . . .                |  |
| 1 pr. Kid Gloves, 1.50; 1 doz. Hdks, 2.50  |  |
| 3 Wool Shawls, @ 1.50, 4.50; 12 yds. Flannel, @ 75 c., 9.00                            |  |
| 50 lbs. Butter, @ 35 c., 17.50; 2 lbs. Indigo, @ 82 $\frac{1}{2}$ c., 1.65 . . . . .   |  |
| 2 galls. Syrup, @ 1.20 2.40; $\frac{1}{2}$ doz. Cotton Hose, 1.25 . . . . .            |  |
| 300 lbs. Cheese, @ 10 c., 30.00; 18 lbs. Rice, @ 7 c., 1.26; 1 lb. Tea, 1.25 . . . . . |  |
| Cases and Packing, 3.25; Drayage, 75 c. . . . .  |  |

---

## BALANCING ACCOUNTS.

20. It is frequently of advantage to the accountant to find the difference between two sums by addition, instead of by subtraction. For example, if he wishes to find the difference between 2427 and 1235, instead of taking the trouble of placing the smaller number under the larger, he will add, mentally, to 1235 a sum that will make the whole equal to 2427, writing the figures as he proceeds under 1235.

|      |               |
|------|---------------|
| 2427 | 1235          |
|      | 1192 balance. |

When both sides of an account contain several amounts first add the larger side in the usual manner; then commence at the top of the columns, on the smaller side of the account, and add downwards, inserting the necessary figures to make the required balance. Thus, to find the balance of the following account:

## EXAMPLE I.

| Dr.     |          | V. I. Andrews. |          | Cr.      |         |
|---------|----------|----------------|----------|----------|---------|
| 1882.   |          | 1882.          |          |          |         |
| Jan. 3. | To Mdse. | \$96.67        | Jan. 10. | By Cash, | \$32.18 |
| " 10.   | " "      | 72.45          | " 17.    | " "      | 67.43   |
| " 24.   | " "      | 43.81          |          | Balance, | 118.32  |
|         |          | \$212.93       |          |          |         |

First, add the larger side; then say,  $8 + 3 = 11$ , and 2, the figure required to make the balance,  $= 13$ . Set down 2 and carry 1.  $1 + 1 + 4 + 3$  (balance)  $= 9$ .  $2 + 7 + 3 = 12$ .  $1 + 3 + 6 + 11 = 21$ . To test the accuracy of the work, add the whole of the smaller side, and include the balance.

## EXAMPLE II.

| Dr.              | George L. Burtis. | Cr.               |           |
|------------------|-------------------|-------------------|-----------|
| <u>1882.</u>     |                   | <u>1882.</u>      |           |
| Feb. 9. To Mdse. | \$ 187.37         | Feb. 15. By Cash, | \$ 150.00 |
| “ 26. “ “        | 37.42             | Mar. 10. “ “      | 437.75    |
| Mar. 4. “ “      | 260.38            | Apr. 7. “ “       | 294.14    |
| Apr. 9. “ “      | 720.16            |                   |           |
| May 6. “ “       | 132.50            |                   |           |

Find the Balance of the following Ledger Account :

| <i>Dr.</i> |    | <i>James M. Newton.</i> |         | <i>Cr.</i>        |         |
|------------|----|-------------------------|---------|-------------------|---------|
| 1882.      |    |                         | 1882.   |                   |         |
| Jan.       | 18 | To Mdse.                | 75      | By Sundries,      | 2058 20 |
| "          | 23 | " Bills Pay.            | 629 45  | " Cash,           | 439 28  |
| "          | 27 | " Mdse.                 | 1839 28 | " Bills Rec.      | 1400 00 |
| Feb.       | 4  | " do.                   | 796 35  | " Mdse.           | 587 40  |
| "          | 21 | " do.                   | 1249 63 | " Cash,           | 849 50  |
| Mar.       | 19 | " Sundries,             | 956 42  | " Commission,     | 1284    |
| May        | 12 | " Mdse.                 | 1697 75 | " P. R. R. Stock, | 1320 00 |
| "          | 20 | " do.                   | 489 50  | " Expenses,       | 149 38  |
| "          | 26 | " L. M. Jones & Co.     | 768 95  | " Cash,           | 675 00  |
| "          | 29 | " Mdse.                 | 865 20  | " Bills Rec.      | 1590 42 |
| June       | 3  | " do.                   | 493 75  | " Balance,        |         |
| "          | 12 | " Sundries,             | 540 25  |                   |         |
| "          | 21 | " Mdse.                 | 1849 36 |                   |         |
| "          | 30 | " do.                   | 1429 34 |                   |         |
| 1882.      |    |                         |         |                   |         |
| July       | 1  | To Balance,             |         |                   |         |

## GENERAL PRINCIPLES OF MULTIPLICATION AND DIVISION.

21. The multiplicand can be found by dividing the product by the multiplier.

### EXAMPLES.

1.  $18 \times 6 = 108$   $108 \div 6 = 18$ , the multiplicand.

Find the answers to the following and prove them.

2. The multiplier is 10 and the product 350, what is the multiplicand?

3. The product of a certain number multiplied by 125 is 12000; what is the number?

22. The multiplier can be found by dividing the product by the multiplicand.

$18 \times 6 = 108$   $108 \div 18 = 6$ , the multiplier.

23. Dividing the multiplicand or multiplier will give the same result as dividing the product.

$$360 \times 24 = 8640, \quad 8640 \div 6 = 1440.$$

$$360 \div 6 = 60, \quad 60 \times 24 = 1440.$$

$$24 \div 6 = 4, \quad 4 \times 360 = 1440.$$

24. Multiplying either the multiplicand or the multiplier will give the same result as multiplying the product.

$$7 \times 4 = 28 \qquad 28 \times 3 = 84$$

$$7 \times 3 = 21, \quad 21 \times 4 = 84 \quad 4 \times 3 = 12, \quad 12 \times 7 = 84$$

25. Multiplying both dividend and divisor or dividing both dividend and divisor will not change the quotient.

$$32 \div 8 = 4$$

$$32 \times 5 = 160,$$

$$8 \times 5 = 40, \quad 160 \div 40 = 4.$$

$$32 \div 4 = 8,$$

$$8 \div 4 = 2, \quad 8 \div 2 = 4.$$

$$8 \div \frac{32}{8} = \frac{4}{1} = 4.$$

26. Dividing the divisor will give the same result as multiplying the quotient.

$$14)126(9, \quad 9 \times 2 = 18.$$

$$14 \div 2 = 7, \quad 126 \div 7 = 18.$$

27. Dividing the dividend will give the same result as dividing the quotient.

$$14)126(9, \quad 9 \div 3 = 3.$$

$$126 \div 3 = 42, \quad 42 \div 14 = 3.$$

28. Multiplying the dividend will multiply the quotient.

$$18 \div 3 = 6, \quad 18 \times 10 = 180, \quad 180 \div 3 = 60.$$

$$6 \times 10 = 60.$$

29. Multiplying the divisor divides the quotient.

$$18 \div 3 = 6, \quad 3 \times 3 = 9.$$

$$18 \div 9 = 2, \quad 6 \div 3 = 2.$$

### CANCELLATION.

30. Cancellation is the process of shortening operations by rejecting equal factors from both dividend and divisor. (See Art. 25.)

31. A factor of a number is an exact divisor of that number.

32. When both multiplication and division are to be performed in one operation, the work can frequently be much shortened by cancellation.

33. Cancelling or rejecting a factor of any number divides the number by that factor.

34. Cancelling a number is the same as dividing that number by itself, and consequently the quotient is 1; but need not be written except when there are no other figures in the dividend.

35. Two or more factors in one term will cancel a factor in the other term, which is equal to their product.

36. When a factor in one term will cancel a factor of a number in the other term, the two similar factors may be cancelled and the remaining factor of the number written in place of the original number.

*Thus,  $18 \times 3$  divided by  $4 \times 2 = 9 \times 3$  divided by 4.*



## EXAMPLES.

1. Divide the product of  $2 \times 3 \times 10$  by the product of  $3 \times 5$ .

$$\frac{2 \times 3 \times 10}{3 \times 5} = 2 \times 2 = 4. \quad \text{Ans.}$$

2. Divide  $4 \times 2 \times 15 \times 7$  by  $3 \times 7 \times 9 \times 5$ ,  
 3. Divide  $12 \times 4 \times 3 \times 5$  by  $3 \times 2 \times 15$ .  
 4. Multiply 180 by 17 and divide the product by 6.  
 5. Multiply 245 by 36 and divide the product by 12.  
 6. 12 boxes, containing 140 oranges each, are to be divided among 70 boys; how many oranges should each boy receive?  
 7. Divide 144 by 36 and multiply the quotient by 18.  
 8. A merchant bought 27 yds. of cloth @ \$2.25 and paid for it in tea @ 75 cts. per lb., how many pounds were required?  
 9. If 9 men do the work of 15 boys, how many men's work will equal the work of 45 boys?

## THE GREATEST COMMON DIVISOR.

37. The Greatest Common Divisor of two or more numbers is the greatest number that will divide each of them without a remainder.

38. To find the greatest common divisor of two numbers.

*Rule.*—Divide the greater by the less; if there is a remainder, divide the divisor by it, and so continue to divide the last divisor by the last remainder until there is no remainder. The last divisor will be the greatest common divisor.

39. To find the greatest common divisor of more than two numbers.

*Rule.*—Begin with the smallest two and find their greatest common divisor; then with the divisor thus found and the next largest, and so on until all the numbers are taken. The last common divisor will be the greatest common divisor of all the numbers.

*Note.*—A common divisor of two numbers is also a divisor of their sum and of their difference.

## EXAMPLES.

1. Find the greatest common divisor of 96 and 276.

OPERATION.

$$\begin{array}{r}
 96)276(2 \\
 \underline{192} \\
 84)96(1 \\
 \underline{84} \\
 12)84(7 \\
 \underline{84}
 \end{array}$$

Ans. 12.

**Explanation.**—After dividing the larger number 276 by the smaller 96, we have a remainder 84, which is used as a divisor of the divisor 96. The remainder thus obtained (12) is used as a divisor of the preceding divisor 84, and, as there is no remainder, 12 is the greatest common divisor of these numbers.

Find the greatest common divisor of the following:

- |  |                 |                 |
|--|-----------------|-----------------|
| 2. 108 and 288                                   | 5. 256 and 480  | 8. 475 and 589  |
| 3. 84 and 154                                    | 6. 78 and 416   | 9. 816 and 798  |
| 4. 460 and 322                                   | 7. 505 and 9045 | 10. 156 and 216 |
| 11. 396, 154, and 72.    12. 416, 324, 816, 252. |                 |                 |

13. A merchant has three pieces of cloth measuring 39, 26, and 52 yds., respectively, which he wishes to cut into pieces all of equal length; what is the greatest length of the pieces by which this can be done?    Ans. 13 yds.

14. What is the longest length of boards that can be used, without cutting, in a fence on two sides of a garden one of which is 80 feet long and the other 144 feet long?

15. What is the greatest width of oil-cloth that can be used, without cutting, to cover the floors of three rooms which are 12, 16, and 24 feet wide respectively?

16. A man has two farms, one containing 132 and the other 187 acres, which he wishes to divide into fields of equal size in both farms. What is the largest number of acres in a field that will enable him to do this?

17. What is the largest number that will divide 432 and 1728 without a remainder?

18. What is the largest number that will exactly divide 236, 416, 324?



# LEAST COMMON MULTIPLE.

40. The Least Common Multiple or dividend of two or more numbers is the least number that can be divided by each without a remainder.

41. To find the least common multiple.

*Rule.*—Write the numbers in a horizontal line. Cancel any number that is a factor of either of the others. Divide by any prime number that will divide two or more of them without a remainder, and write the quotients of those so divided, and also the undivided numbers, in a line beneath.

Divide the numbers in this second line in the same manner, and so continue until no two numbers in the lowest line can be divided by the same number greater than 1, without a remainder. Then multiply the divisors and the numbers in the lowest line together, and their continued product will be the least common multiple required.

## EXAMPLES.

1. Find the least common multiple of 3, 10, 12, 16.

### OPERATION.

$$\begin{array}{r} 2) 3, 10, 12, 16 \\ 2) \quad 5, 6, 8 \\ \hline \quad 5, 3, 4 \end{array}$$

$$2 \times 2 \times 5 \times 3 \times 4 = 240$$

**Explanation.**—The numbers of which 2 is a common divisor are divided, and the quotients with 5, of which 2 is not a common divisor, are placed beneath. In the last division 6 and 8 are divided. The divisors 2 and 2, and the undivided numbers 5, 3, and 4 are multiplied together, and the product, 240, is the least common multiple.

Find the least common multiple of

2. 8, 16, 20, 24

3. 7, 21, 28, 35

4. 2, 9, 18, 27

5. 72, 44, 18, 26, 27

6. 163, 184, 326, 225

7. 9, 15, 18, 16, 12, 30, 45

8. A man gave an order for boxes in which he might place packages 3, 4, and 6 inches long, so that a number of either might exactly fill the space; what is the length of the shortest box in which this could be done?

## FRACTIONS.



42. A Fraction is one or more of the equal parts into which a unit is divided.

43. A Common Fraction is one in which the unit is divided into any number of equal parts.

44. A Decimal Fraction is one in which the unit is divided into tenths, hundredths, thousandths, etc.

## COMMON FRACTIONS.

45. When a unit is divided into two equal parts, each part is called *one-half*; when it is divided into four equal parts, each part is called *one-fourth* (or quarter). When into ten equal parts, each part is called *one-tenth*. When into a hundred, *one-hundredth*, etc. The name expresses the number of parts into which the unit is divided, and the greater the number of parts the smaller they must be. Tenths are smaller than thirds, fourths than halves.

46. The number which expresses into how many equal parts the unit is divided is called the denominator, and is written *below* the line. The number which expresses how many of the equal parts are taken is called the numerator, and is written *above* the line.  $\frac{4}{5}$  is a fraction; 5 is the denominator, and shows that the whole is divided into *five* equal parts; 4 is the numerator, and shows that *four* of these parts are taken. One-half is written  $\frac{1}{2}$ , two-thirds,  $\frac{2}{3}$ , nine-twentieths,  $\frac{9}{20}$ , twenty-four-hundredths,  $\frac{24}{100}$ .

47. A Proper Fraction is one in which the numerator is less than the denominator, and whose value is less than a unit, as  $\frac{1}{4}$ ,  $\frac{2}{3}$ ,  $\frac{9}{12}$ .

48. An Improper Fraction is one in which the numerator is equal to or greater than the denominator, and whose value therefore is 1 or more, as  $\frac{2}{1}$ ,  $\frac{3}{2}$ ,  $\frac{4}{3}$ ,  $\frac{5}{2}$ .

49. A Mixed Number consists of a whole number and a fraction, as  $2\frac{1}{2}$ ,  $5\frac{3}{4}$ .

50. An Integer or Whole Number may be expressed in the form of a fraction by writing 1 under it as a denominator: thus 3 may be expressed as a fraction by  $\frac{3}{1}$  (three-ones).

51. A Compound Fraction is a fraction of a fraction; as  $\frac{1}{2}$  of  $\frac{2}{3}$ ,  $\frac{2}{3}$  of  $\frac{3}{4}$  of  $\frac{4}{5}$  of  $\frac{5}{6}$ .

## PRINCIPLES OF FRACTIONS.

52. A fraction indicates division, the numerator being the dividend and the denominator the divisor, the quotient being of the same value as the fraction.—Thus,  $\frac{12}{4}$  is of the same value as the quotient of 12 divided by 4, which is 3.

53. Multiplying the numerator multiplies the fraction, and dividing the numerator divides the fraction.—If we multiply the numerator of the fraction  $\frac{1}{2}$  by 3, the result is  $\frac{3}{2}$ , which is three times as great as  $\frac{1}{2}$ . If we divide the numerator of the fraction  $\frac{2}{4}$  by 2, the result is  $\frac{1}{4}$ , which is  $\frac{1}{2}$  as great as  $\frac{2}{4}$ .

54. Multiplying the denominator divides the fraction, and dividing the denominator multiplies the fraction.—If the denominator of  $\frac{1}{2}$  is multiplied by 2, the result is  $\frac{1}{4}$ , which is one-half of  $\frac{1}{2}$ . If we divide the denominator of  $\frac{1}{4}$  by 2, the result is  $\frac{1}{2}$ , which is twice as great as  $\frac{1}{4}$ .

55. Multiplying or dividing both the numerator and denominator does not change the value of the fraction.—If we multiply both the numerator and denominator of  $\frac{1}{2}$  by 2, the result is  $\frac{2}{4}$ , which has the same value as  $\frac{1}{2}$ . If we divide both numerator and denominator of  $\frac{2}{4}$  by 2, the result,  $\frac{1}{2}$ , has the same value as  $\frac{2}{4}$ .

56. By the preceding it will be seen that a fraction can be *multiplied* by multiplying the numerator or dividing the denominator. A fraction can be *divided* by dividing the numerator or multiplying the denominator.

57. Multiplying or dividing either the numerator or denominator produces the same result as doing the opposite with the other, and multiplying or dividing both terms alike does not change the value of the fraction.

### EXERCISES.

Read the following fractions, and tell what each numerator and each denominator shows:

$\frac{6}{10}$ ;  $\frac{8}{9}$ ;  $\frac{15}{27}$ ;  $\frac{120}{150}$ ;  $\frac{144}{1728}$ ;  $\frac{82}{1000}$ ;  $\frac{185}{1802}$ ;  $\frac{2}{3}$  of  $\frac{6}{10}$ ;  $\frac{4}{5}$  of  $\frac{1}{3}$  of  $\frac{8}{20}$ .

Write the following in figures:

One third; two fifths; four ninths; twelve thirds; ten twentieths; seventeen twenty-thirds; thirty one-hundred-and-eighths; three five-thousandths; twelve two-hundredths; forty-eight sixteenths; three sevenths of nineteen forty-fifths; twelve hundred ninety-thousandths.

Write three and a half; fourteen and a quarter; sixty-five and twenty-three forty-eighths; eighteen and eleven eighty-fourths.

How many halves in 3; in 5; in 18; in 47; in 49?

Write 6 in the form of a fraction; also 18, 42.

How many thirds in 2; in 4; in 5; in 11; in 50?

How many fourths in 2; how many sixths in 12; how many tenths in 8; how many hundredths in 16?

How many quarters in 8 dollars; in 10; in 25; in 50?

How many halves in  $3\frac{1}{2}$ ; how many thirds in  $4\frac{1}{3}$ ; how many fourths in  $6\frac{3}{4}$ ; how many twelfths in  $5\frac{2}{12}$ ; in  $4\frac{7}{12}$ ; in  $8\frac{5}{12}$ ?

How much is  $\frac{1}{2}$  of 8; of 14? How much is  $\frac{1}{4}$  of 20? How much is  $\frac{3}{4}$ ?

A man had 18 oxen and sold  $\frac{2}{3}$  of them, how many did he have left? After selling  $\frac{5}{8}$ , how many did he have left?

## REDUCTION OF FRACTIONS.



**58. The Reduction of Fractions** is the process of changing them from one form to another without changing their value. The object of such change is to obtain the simplest or most convenient form for use.

## CASE I.

**59. To Change or Reduce a Fraction to its Lowest Terms.**—A fraction is in its lowest terms when no number greater than 1 will divide both the numerator and denominator without a remainder.

**Rule 1.**—Divide both numerator and denominator by any number greater than 1 that will divide them without a remainder (see Art. 55). Then divide both terms of the fraction so obtained in the same manner, and thus continue until there is no number greater than 1 that will exactly divide both terms of the fraction.

**Suggestion.**—A number is exactly divisible

By 2 if it ends with 0, 2, 4, 6, or 8.

By 3 or 9 if the sum of its digits is exactly divisible by 3 or 9.

By 5 if it ends with 0 or 5.

## EXAMPLES.

1. Reduce  $\frac{6}{8}$  to its lowest terms.

## OPERATION.

$$6 \div 2 = 3, 8 \div 2 = 4. \quad 2) \frac{6}{8} = \frac{3}{4}. \quad \text{Ans. } \frac{3}{4}.$$

2. Reduce  $\frac{28}{56}$  to its lowest terms.

$$4) \frac{28}{56} = \frac{7}{14} \quad 7) \frac{7}{14} = \frac{1}{2} \quad \text{Ans.}$$

**Rule 2.**—Divide both numerator and denominator by their greatest common divisor (see Art 38). Thus,—

$$28) \frac{28}{56} = \frac{1}{2} \quad \text{Ans.}$$

3. Reduce  $\frac{125}{1000}$  to its lowest terms. Ans.  $\frac{1}{8}$ .

4. Reduce  $\frac{42}{189}$  to its lowest terms. Ans.  $\frac{2}{9}$ .

Change or reduce to their lowest terms:

- |  |   |
|--|---|
| 5. $\frac{150}{200}$ ; $\frac{168}{216}$ ; $\frac{192}{288}$ ; $\frac{198}{330}$ . | 8. $\frac{736}{1168}$ ; $\frac{798}{1218}$ ; $\frac{852}{1380}$ ; $\frac{1062}{1534}$ .   |
| 6. $\frac{224}{388}$ ; $\frac{288}{444}$ ; $\frac{396}{728}$ ; $\frac{450}{980}$ . | 9. $\frac{1210}{1694}$ ; $\frac{1320}{1848}$ ; $\frac{1680}{1968}$ ; $\frac{510}{2016}$ . |
| 7. $\frac{208}{330}$ ; $\frac{285}{328}$ ; $\frac{336}{504}$ ; $\frac{675}{832}$ . | 10. $\frac{525}{1785}$ ; $\frac{819}{2483}$ ; $\frac{600}{1050}$ ; $\frac{3591}{22743}$ . |

11. A man bought  $\frac{3}{4}$  of a vessel for \$10,000. How much more would he have had to pay for the whole vessel?

12. One lot contained  $\frac{1}{3}$  of an acre, and another contained  $\frac{48}{40}$  of an acre. Which was the larger of the two?

13. Which is the most,  $\frac{54}{128}$ ,  $\frac{48}{112}$ , or  $\frac{72}{144}$ ?

14. Four partners owned the capital of a firm. The first had  $\frac{1}{8}$ , the second  $\frac{1}{8}$ , the third  $\frac{1}{8}$ , and the fourth  $\frac{1}{8}$ . Express each one's share in its lowest terms.

#### CASE II.

60. To change a fraction to any required denominator.

*Rule.*—Multiply both numerator and denominator by the quotient of the required denominator divided by the denominator of the given fraction.

#### EXAMPLES.

1. Change  $\frac{3}{5}$  to fortieths.

#### OPERATION.

$$40 \div 5 = 8$$

$$\frac{3}{5} \times 8 = \frac{24}{40}$$

$$\frac{5}{5} \times 8 = \frac{40}{40}$$

$$\text{Ans. } \frac{24}{40}.$$

2. Change  $\frac{1}{2}$  to hundredths; also to thousandths.

3. Change  $\frac{1}{6}$ ,  $\frac{2}{3}$ ,  $\frac{3}{8}$ ,  $\frac{1}{24}$ ,  $\frac{5}{12}$  each to ninety-sixths and to seventy-seconds.

4. Change  $\frac{1}{6}$ , 3,  $\frac{5}{16}$ ,  $\frac{2}{10}$ ,  $\frac{3}{8}$  each to eightieths.

5. Change 7 and 10 each to fifths, to twelfths, to thirtieths.

6. Change  $\frac{1}{4}$ ,  $\frac{1}{10}$ ,  $\frac{1}{25}$ ,  $\frac{1}{8}$ ,  $\frac{1}{3}$ ,  $\frac{1}{6}$ ,  $\frac{1}{16}$ , to hundredths.

7. Change  $\frac{9}{10}$ ,  $\frac{3}{20}$ ,  $\frac{2}{50}$ , 6, 15,  $23\frac{2}{3}$ ,  $2\frac{1}{2}$  to hundredths.



## CASE III.

61. To change whole or mixed numbers to improper fractions.

*Rule.*—Multiply the whole number by the denominator of the fraction; to the product add the numerator, and set their sum over the denominator.

## EXAMPLES.

1. Change  $4\frac{1}{2}$  to halves.

$$4 \times 2 = 8. \quad 8 + 1 = 9. \quad \text{Ans. } \frac{9}{2}.$$

2. Change the following to improper fractions:

$$4\frac{1}{4}, 6\frac{2}{3}, 18\frac{1}{2}, 7\frac{3}{5}, 12\frac{1}{2}, 6\frac{1}{4}, 16\frac{3}{4}, 33\frac{1}{4}, 45\frac{2}{3}, 12\frac{3}{100}, 8\frac{4}{11}.$$

3. Into how many pieces of  $\frac{1}{4}$  yard each can a piece of cloth be cut that is  $14\frac{3}{4}$  yards long?

4. How many packages of soda containing  $\frac{1}{2}$  pound each can be made from  $19\frac{1}{2}$  pounds?

## CASE IV.

62. To change improper fractions to whole or mixed numbers.

*Rule.*—Divide the numerator by the denominator. If there is a remainder, place it over the said denominator, and reduce it to its lowest terms. After which place it at the right of the quotient already obtained.

## EXAMPLES.

1. Change  $\frac{15}{6}$  to a whole or mixed number.

$$15 \div 6 = 2 \text{ and } 3 \text{ remainder.}$$

$$3 \overline{) \frac{3}{6}} = \frac{1}{2} \quad \text{Ans. } 2\frac{1}{2}.$$

2. In  $\frac{1}{4}$  bushels, how many bushels? Ans.  $10\frac{3}{4}$ .

3. In  $1\frac{2}{3}$  yards, how many yards? Ans.  $16\frac{1}{2}$ .

Change the following to whole or mixed numbers:

|                   |                      |                       |                      |
|-------------------|----------------------|-----------------------|----------------------|
| 4. $\frac{15}{6}$ | 7. $\frac{124}{6}$   | 10. $\frac{1284}{18}$ | 13. $\frac{104}{12}$ |
| 5. $\frac{25}{4}$ | 8. $\frac{4264}{12}$ | 11. $\frac{222}{11}$  | 14. $\frac{540}{32}$ |
| 6. $\frac{32}{8}$ | 9. $\frac{112}{7}$   | 12. $\frac{3216}{17}$ | 15. $\frac{682}{4}$  |

16. A boy had  $1\frac{3}{4}$  dollars, how many dollars had he?
17. In  $2\frac{3}{4}$  bushels, how many bushels?
18. In  $2\frac{3}{4}$  gallons, how many gallons?
19. Which is larger,  $\frac{37}{18}$  or  $\frac{19}{4}$ ?
20. What is the difference between  $\frac{4}{3}$  yards and 45 feet, long measure?

## CASE V.

63. To change compound fractions to simple ones.

*Rule.*—Multiply the numerators together for a new numerator, and the denominators together for a new denominator. Then reduce the fraction so obtained to its lowest terms.

*Notes.*—The operation can frequently be much shortened by cancelling factors that are common to both the numerators and the denominators before multiplying.

If there are whole or mixed numbers in the compound fraction, they should be first changed to improper fractions. Thus,  $\frac{3}{4}$  of 8 is the same as  $\frac{3}{4}$  of  $\frac{8}{1}$ .

## EXAMPLES.

1. Change  $\frac{1}{2}$  of  $\frac{3}{5}$  of  $\frac{7}{11}$  to a simple fraction.

$$\frac{1 \times 3 \times 7}{2 \times 5 \times 11} = \frac{21}{110} \text{ Ans.}$$

2. Change  $\frac{2}{3}$  of  $\frac{6}{10}$  of  $\frac{5}{8}$  of  $\frac{8}{9}$  to a simple fraction.

## FIRST OPERATION.

$$\text{By cancellation, } \frac{2}{3} \text{ of } \frac{\overset{2}{\cancel{6}}}{\underset{2}{\cancel{10}}} \text{ of } \frac{\cancel{5}}{\cancel{8}} \text{ of } \frac{\cancel{8}}{9} = \frac{2}{9}$$

## SECOND OPERATION.

$$\frac{2 \times 6 \times 5 \times 8}{3 \times 10 \times 8 \times 9} = \frac{480}{2160}$$

$$\frac{480}{2160} \text{ reduced to its lowest terms} = \frac{2}{9}.$$

*Explanation of First Operation.*—8 is common to both terms, and is cancelled; 3 is a factor of 6, and is therefore cancelled in both terms, leaving 2 in the numerator; 5 is cancelled in the numerator and 10 in the denominator, leaving 2 in the denominator; then 2 in the denominator and numerator are cancelled, leaving only 2 in the numerator and 9 in the denominator; and as these have no common factors, the 2 is written for the numerator and the 9 for the denominator required.

Change the following compound fractions to simple ones :

3.  $\frac{1}{4}$  of  $\frac{2}{7}$  of  $\frac{3}{8}$  Ans.  $\frac{3}{21}$ .

4.  $\frac{2}{3}$  of  $\frac{1}{10}$  of  $\frac{2}{3}$  of  $\frac{1}{2}$  Ans.  $\frac{1}{15}$ .

5.  $\frac{2}{7}$  of  $2\frac{1}{2}$  of  $\frac{1}{11}$  of  $\frac{1}{3}$

6.  $\frac{7}{11}$  of  $\frac{3}{8}$  of  $\frac{1}{2}$  of  $\frac{5}{10}$  of  $4\frac{1}{2}$

7.  $1\frac{1}{4}$  of  $\frac{2}{7}$  of  $\frac{1}{5}$  of  $\frac{2}{15}$

8.  $\frac{1}{2}$  of  $\frac{2}{3}$  of  $\frac{1}{4}$  of  $\frac{1}{11}$  of  $\frac{2}{5}$  of  $\frac{3}{15}$

### COMMON DENOMINATOR.

64. To change two or more fractions which have different denominators to equivalent fractions having a common (i. e. the same) denominator.

*Rule.*—Multiply all the denominators together for the common denominator, and multiply each numerator by all the denominators except its own for the numerators.

*Note.*—Whole and mixed numbers should be changed to improper fractions, compound fractions, to simple ones, and all to their lowest terms before applying the rule.

#### EXAMPLES.

1. Change  $\frac{1}{2}$ ,  $\frac{2}{3}$ , and  $\frac{3}{4}$  to a common denominator.

$2 \times 3 \times 4 = 24$ , the common denominator.

$1 \times 3 \times 4 = 12$ , the new numerator of the first fraction.

$2 \times 2 \times 4 = 16$ , the new numerator of the second fraction.

$3 \times 2 \times 3 = 18$ , the new numerator of the third fraction.

Ans.  $\frac{12}{24}$ ,  $\frac{16}{24}$ ,  $\frac{18}{24}$ .

*Explanation.*—The product of the denominators 2, 3, and 4 multiplied together is 24, which is written as many times as there are fractions. All the denominators except that of the first fraction are 3 and 4, which, with the first numerator, are multiplied together, and the product, 12, is written over the common denominator, thus,  $\frac{12}{24}$ , which is a fraction of equal value to  $\frac{1}{2}$ . The numerator of the second fraction, 2, multiplied by the denominators of the other fractions, 2 and 4, gives us 16. The numerator of the third fraction, 3, multiplied by the denominators of all the other fractions, 2 and 3, gives us 18. We then have three fractions having the same denominator, 24, which are the same in value as  $\frac{1}{2}$ ,  $\frac{2}{3}$ , and  $\frac{3}{4}$ .

The new numerators of each fraction can also be found by taking such

parts of the common denominator as is expressed by the fraction. For example, 24 is the common denominator of the above fraction.

$\frac{1}{2}$  of 24 = 12, the new numerator of the first fraction.

$\frac{2}{3}$  of 24 = 16, the new numerator of the second fraction.

$\frac{3}{4}$  of 24 = 18, the new numerator of the third fraction.

Change the following to common denominators:

1.  $\frac{2}{3}, \frac{5}{6}, \frac{1}{4}$

Ans.  $\frac{8}{24}, \frac{10}{24}, \frac{6}{24}$ .

2.  $\frac{2}{5}, \frac{4}{11}, \frac{3}{10}$

3.  $\frac{1}{8}, \frac{2}{9}, \frac{7}{12}$

4.  $\frac{1}{2}, 2\frac{1}{4}, \frac{1}{5}$

5.  $3\frac{1}{2}, 2\frac{1}{4}$

6.  $\frac{8}{12}, \frac{1}{24}, \frac{3}{12}, \frac{5}{24}$

7.  $3, \frac{2}{3}, \frac{1}{2}$  of  $\frac{1}{4}$

8.  $\frac{2}{3}$  of  $\frac{5}{8}, 4\frac{7}{8}, 6\frac{9}{10}$

9.  $4\frac{1}{2}, 8\frac{3}{4}, 4\frac{1}{2}$  of  $\frac{1}{4}$  of  $\frac{3}{4}$

## LEAST COMMON DENOMINATOR.

65. To change two or more fractions of different denominators to the smallest denominator to which they can all be reduced without changing their value.

*Rule.*—Find the least common multiple of the denominators for the least common denominator. (See Art. 41, page 29.) Divide the least common denominator by the denominator of each fraction, and multiply the quotient by the numerator. The several products will be the several new numerators, under each of which write the least common denominator.

### EXAMPLES.

1. Change  $\frac{2}{3}, \frac{1}{2}, \frac{3}{4}, \frac{5}{6}$ , to fractions having the least common denominator.

|                        |                                  |                               |
|------------------------|----------------------------------|-------------------------------|
|                        | $12 \div 4 = 3, 3 \times 3 = 9$  | $\frac{3}{4} = \frac{9}{12}$  |
|                        | $12 \div 2 = 6, 6 \times 1 = 6$  | $\frac{1}{2} = \frac{6}{12}$  |
| OPERATION.             | $12 \div 3 = 4, 4 \times 2 = 8$  | $\frac{2}{3} = \frac{8}{12}$  |
| $2) 4, 2, 3, 6$        | $12 \div 6 = 2, 2 \times 5 = 10$ | $\frac{5}{6} = \frac{10}{12}$ |
| $3) 2, 1, 3, 3$        |                                  |                               |
| $\frac{2}{3}, 1, 1, 1$ |                                  |                               |

$2 \times 3 \times 2 = 12$ , the common multiple.

Ans.  $\frac{9}{12}, \frac{6}{12}, \frac{8}{12}, \frac{10}{12}$

2. Change  $\frac{2}{3}$ ,  $\frac{4}{15}$ , and  $\frac{1}{10}$  to equivalent fractions having the least common denominator. Ans.  $\frac{4}{6}$ ,  $\frac{8}{15}$ ,  $\frac{2}{30}$ .

Change the following to equivalent fractions having the least common denominator:

$$3. \frac{2}{3}, \frac{4}{5}, \frac{2}{5}, \frac{7}{10}, \frac{6}{15}$$

$$4. \frac{1}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{2}$$

$$5. 3\frac{1}{2}, 2\frac{1}{3}, \frac{1}{2} \text{ of } \frac{1}{4}, \frac{2}{3} \text{ of } \frac{5}{8}$$

$$6. \frac{1}{8}, 2\frac{1}{4}, \frac{1}{12}, \frac{1}{14}$$

$$7. \frac{1}{3} \text{ of } \frac{2}{3} \text{ of } \frac{1}{2}, 3\frac{1}{2}, 6\frac{1}{2}$$

$$8. \frac{2}{3} \text{ of } \frac{2}{3}, \frac{1}{2}, 42$$

9. One man owns  $\frac{2}{3}$  of a vessel, another  $\frac{1}{10}$ , another  $\frac{1}{100}$ , and another  $\frac{7}{100}$ , what is the lowest denominator by which all can express the values of their several shares. Ans.  $\frac{30}{100}, \frac{16}{100}, \frac{14}{100}$ .



## ADDITION OF FRACTIONS.

66. Only fractions of like parts or similar denomination can be added. Halves can be added to halves and quarters to quarters, but halves cannot be added to quarters; 3 halves and 5 halves make 8 halves; 3 quarters and 5 quarters make 8 quarters; but 3 halves and 5 quarters are neither 8 halves nor 8 quarters, any more than 3 apples and 5 oranges are either 8 apples or 8 oranges.

67. To add fractions.

*Rule.*—Change the fractions, if they are not already so, to a common denominator; add together the numerators, and place their sum over the common denominator. Reduce the result to its simplest form.

If mixed numbers are to be added, find the sum of the fractions and whole numbers separately, and add the results.

### EXAMPLES.

1. Find the sum of  $\frac{1}{2}$ ,  $\frac{2}{3}$ , and  $\frac{3}{4}$ .

Changed to the least common denominator they equal  $\frac{6}{12}$ ,  $\frac{8}{12}$ ,  $\frac{9}{12}$ . The sum of their numerators, 6, 8, 9 = 23.

The sum of the fractions  $\frac{23}{12} = 1\frac{11}{12}$  Ans.

2. Find the sum of  $\frac{3}{4}$ ,  $\frac{1}{2}$ ,  $\frac{2}{3}$ , and  $\frac{5}{8}$ .

Ans.  $2\frac{1}{2}$ .

Find the sum of the following fractions:

- |   |  |
|---|--|
| 3. $\frac{2}{3}, \frac{4}{5}, \frac{5}{6}$ . Ans. $2\frac{3}{10}$ . | 8. $\frac{4}{5}$ of $\frac{6}{7}, \frac{2}{3}, \frac{8}{15}$ |
| 4. $\frac{8}{9}, \frac{6}{7}, \frac{4}{11}, \frac{9}{15}$           | 9. $2\frac{1}{4}, 3\frac{1}{2}, 4\frac{3}{4}$                |
| 5. $18\frac{1}{2}, 20\frac{5}{8}, 35\frac{7}{12}$                   | 10. $14\frac{1}{7}, \frac{12}{19}, \frac{18}{78}$            |
| 6. $19\frac{2}{3}, \frac{16}{45}, \frac{2}{3}$                      | 11. $\frac{125}{144}, \frac{32}{1728}, \frac{63}{4840}$      |
| 7. $\frac{3}{4}$ of 6, $18\frac{1}{2}$                              | 12. $\frac{19}{147}, \frac{81}{198}, \frac{463}{924}$        |

13. A man having  $\frac{1}{4}$  of a vessel, bought  $\frac{1}{32}$ , then  $\frac{1}{16}$ , then  $\frac{1}{4}$ ; what part of the vessel did he own?

14. One man owned  $\frac{1}{2}$  of the capital of a company, another owned  $\frac{3}{16}$ , another  $\frac{6}{30}$ ; how much did the three men own?



## SUBTRACTION OF FRACTIONS.

68. As in addition of fractions so in subtraction, the fractions must be of similar denomination.

### CASE I.

69. To subtract a fraction from a fraction.

*Rule.*—Change the fractions to a common denominator, if not already so; find the difference between the numerators and write it over the common denominator.

### EXAMPLE.

1. From  $\frac{1}{2}$  take  $\frac{1}{3}$ .

$$\frac{1}{2} = \frac{3}{6} \quad 3 \text{ sixths.}$$

$$\frac{1}{3} = \frac{2}{6} \quad 2 \text{ sixths.}$$

—  
Difference 1 sixth, or  $\frac{1}{6}$  Ans.

2. Find the difference between  $\frac{2}{3}$  and  $\frac{4}{5}, \frac{6}{7}$  and  $\frac{7}{9}$ .

3. From  $\frac{3}{4}$  take  $\frac{5}{12}$ ; from  $\frac{1}{2}$  take  $\frac{4}{18}$ .

Find the value of the following :

|                                 |                                 |                                  |
|---------------------------------|---------------------------------|----------------------------------|
| 4. $\frac{2}{3} - \frac{1}{4}$  | 7. $\frac{3}{8} - \frac{1}{12}$ | 10. $\frac{3}{4} - \frac{1}{5}$  |
| 5. $\frac{7}{12} - \frac{2}{3}$ | 8. $\frac{1}{2} - \frac{1}{3}$  | 11. $\frac{1}{8} - \frac{1}{10}$ |
| 6. $\frac{1}{2} - \frac{3}{10}$ | 9. $\frac{2}{3} - \frac{1}{4}$  | 12. $\frac{1}{2} - \frac{1}{3}$  |

13. A man owned  $\frac{3}{4}$  of a farm, and sold  $\frac{1}{4}$  of what he had; how much did he have left?

14. A man had  $\frac{1}{4}$  of  $\frac{1}{2}$  of an interest in a peach orchard; after selling  $\frac{1}{16}$  of his interest, how much did he have left?

15. A man owns  $\frac{1}{2}$  of a farm, his brother  $\frac{1}{8}$ , and his sister the remainder of the farm. How much was the sister's share?

16. A farmer bequeathed  $\frac{1}{4}$  of his property to his son,  $\frac{1}{4}$  to each of his three daughters, and the remainder to his wife. How much was her share?

#### CASE II.

70. To subtract a fraction from a whole number.

*Rule.*—Borrow one from the whole number and change it to a fraction having the same denominator as the given fraction. From this subtract the fraction, and write the whole number less 1.

#### EXAMPLES.

1. From 16 take  $\frac{3}{4}$ .

$$1 = \frac{4}{4}, \quad \frac{4}{4} - \frac{3}{4} = \frac{1}{4}, \quad 16 - 1 = 15 \qquad \text{Ans. } 15\frac{1}{4}.$$

2. From 650 dollars take  $125\frac{1}{2}$  dollars.

3. From 330 take  $226\frac{1}{8}$ ; from 428 take  $311\frac{3}{5}$ .

#### CASE III.

71. To subtract one mixed number from another.

*Rule.*—Change the fractions, if necessary, to a common denominator, and if the fraction in the subtrahend is smaller than that of the minuend, subtract one fraction from the other, and the smaller whole number from the larger whole number.

But if the fraction in the subtrahend is larger than that in the minuend, borrow 1 from the whole number. After changing it to the same denominator as the fraction, add it to the fraction in the minuend. Then subtract as before.

1. From  $14\frac{1}{2}$  take  $3\frac{1}{3}$ .

$$\begin{array}{r} \frac{1}{2} = \frac{3}{6} \\ \frac{1}{3} = \frac{2}{6} \end{array} \quad \begin{array}{l} \text{From } 14\frac{3}{6} \\ \text{Take } \underline{3\frac{2}{6}} \\ \text{Ans. } 11\frac{1}{6} \end{array}$$

2. From  $10\frac{1}{3}$  take  $4\frac{1}{4}$ .

$$\begin{array}{r} \frac{1}{3} = \frac{4}{12} \quad \frac{12}{12} + \frac{4}{12} = \frac{16}{12} \quad \frac{3}{4} = \frac{9}{12} \\ \text{From } 9\frac{16}{12} \\ \text{Take } \underline{4\frac{9}{12}} \\ \text{Ans. } 5\frac{7}{12} \end{array}$$

Mixed numbers may be changed to improper fractions and their difference taken as in subtracting one fraction from another.

#### EXAMPLES.

$$2\frac{1}{2} - 1\frac{1}{4} \quad 2\frac{1}{2} = \frac{5}{2} \quad 1\frac{1}{4} = \frac{5}{4}$$

Changed to a common denominator we have

$$\frac{20}{8} - \frac{10}{8} = \frac{10}{8} = 1\frac{1}{4} \text{ Ans.}$$

3. From 81 take  $16\frac{3}{4}$ . From  $420\frac{2}{3}$  take  $169\frac{1}{12}$ .

4. From  $25\frac{2}{3}$  take  $16\frac{9}{10}$ . From  $42\frac{1}{2}$  take  $32\frac{1}{3}$ .



## MULTIPLICATION OF FRACTIONS.

72. To multiply a fraction by a fraction.

#### CASE I.

**Rule.**—Multiply the numerators together for a new numerator,



and the denominators together for a new denominator. Reduce the result to its simplest form.

EXAMPLES.

1. Multiply  $\frac{3}{4}$  by  $\frac{2}{3}$ .

$$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12} = \frac{1}{2} \text{ Ans.}$$

2. Multiply  $\frac{1}{2}$  by  $\frac{2}{3}$  by  $\frac{6}{8}$  by  $\frac{8}{9}$ .

$$\frac{1}{2} \times \frac{2}{3} \times \frac{6}{8} \times \frac{8}{9} = \frac{96}{432} = \frac{2}{9} \text{ Ans.}$$

Cancellation often shortens the operation.

Equal factors common to both numerator and denominator may be cancelled before multiplying.

**Suggestion.**—2 and 8, factors common to both terms, are cancelled; 3 is also cancelled in the denominator, and 6 in the numerator, leaving 2 in the numerator. Then as 2 and 1 are the only undivided numbers in the numerator, and 9 is the only remaining number in the denominator, we get the answer at once in its lowest terms,  $\frac{1}{9}$ .

$$\frac{1}{2} \times \frac{2}{3} \times \frac{6}{8} \times \frac{8}{9} = \frac{2}{9}$$

Multiply

- |                                     |  |   |
|-------------------------------------|--|---|
| 3. $\frac{2}{3}$ by $\frac{3}{4}$   | 7. $\frac{3}{8}$ by $\frac{6}{11}$                   | 11. $\frac{2}{3}$ by $\frac{1}{21}$ by $\frac{1}{4}$                  |
| 4. $\frac{1}{2}$ by $\frac{8}{9}$   | 8. $\frac{12}{13}$ by $\frac{5}{6}$                  | 12. $\frac{1}{5}$ by $\frac{2}{13}$ by $\frac{1}{210}$                |
| 5. $\frac{1}{12}$ by $\frac{1}{11}$ | 9. $\frac{14}{15}$ by $\frac{1}{4}$                  | 13. $\frac{2}{3}$ by $\frac{1}{20}$ by $1\frac{1}{2}$                 |
| 6. $\frac{1}{12}$ by $\frac{1}{11}$ | 10. $\frac{2}{3}$ by $\frac{1}{7}$ by $\frac{8}{11}$ | 14. $\frac{1}{2}$ of $\frac{1}{3}$ by $\frac{2}{3}$ of $\frac{1}{11}$ |

CASE II.

73. To multiply a fraction by a whole number.

**Rule.**—Multiply the numerator of the fraction by the whole number and write the product over the denominator.

Or, divide the denominator of the fraction by the whole number when it can be done without a remainder, and write the quotient under the numerator.

**EXAMPLES.**

1. Multiply
- $\frac{1}{12}$
- by 6.

$$\frac{1}{12} \times 6 = \frac{6}{12} = \frac{1}{2} \quad \frac{1}{12} + \frac{1}{6} = \frac{1}{2}$$

Multiply

- |                                  |                                    |   |
|----------------------------------|------------------------------------|---|
| 2. $\frac{2}{3}$ by 8            | 6. $\frac{3}{4}$ by 20             | 10. $\frac{1\frac{2}{3}}{8}$ by 15            |
| 3. $\frac{8}{11}$ by 20          | 7. $\frac{1\frac{1}{2}}{8}$ by 5   | 11. $\frac{3\frac{2}{3}}{80}$ by 90           |
| 4. $\frac{1\frac{1}{2}}{8}$ by 4 | 8. $\frac{1\frac{1}{2}}{7}$ by 8   | 12. $\frac{4\frac{5}{6}}{27\frac{5}{3}}$ by 3 |
| 5. $\frac{9}{27}$ by 9           | 9. $\frac{1\frac{1}{2}}{32}$ by 12 | 13. $\frac{1\frac{5}{6}}{50}$ by 45           |

**CASE III.**

74. To multiply a whole number by a fraction.

*Rule.*—Multiply the whole number by the numerator of the fraction, and divide the product by the denominator.

Or, divide the whole number by the denominator of the fraction, and multiply the quotient by the numerator.

**EXAMPLES.**

1. Multiply 24 by
- $\frac{5}{6}$
- .

$$24 \times \frac{5}{6} = \frac{120}{6} = 20, \quad 24 \div 6 = 4, \quad 4 \times 5 = 20$$

Multiply

- |                         |                         |                            |
|-------------------------|-------------------------|----------------------------|
| 2. 18 by $\frac{3}{4}$  | 5. 32 by $\frac{1}{11}$ | 8. 184 by $\frac{1}{2}$    |
| 3. 125 by $\frac{7}{8}$ | 6. 295 by $\frac{2}{3}$ | 9. 729 by $\frac{3}{4}$    |
| 4. 245 by $\frac{3}{8}$ | 7. 37 by $\frac{1}{2}$  | 10. 6384 by $\frac{4}{18}$ |

In multiplying a mixed number by a whole number, multiply the fraction and whole number separately, and add their products.

In multiplying a whole number by a mixed number, multiply by the whole number and fraction separately, and add the products. When a mixed number is to be multiplied by a mixed number, it is generally best to reduce the mixed numbers to improper fractions, and then multiply as in multiplying a fraction by a fraction.

11. Multiply
- $3\frac{1}{2}$
- by 5.

$$\begin{aligned} \frac{1}{2} \times 5 &= \frac{5}{2} = 2\frac{1}{2} \\ 3 \times 5 &= 15 \\ \frac{1}{2} \times 15 &= 17\frac{1}{2} \text{ Ans.} \end{aligned}$$

$$\begin{aligned} 3\frac{1}{2} \\ \underline{5} \\ \frac{1}{2} \times 5 &= 2\frac{1}{2} \\ 3 \times 5 &= 15 \\ \hline 17\frac{1}{2} \end{aligned}$$

14. Multiply 5 by  $3\frac{1}{2}$ .

$$5 \times \frac{1}{2} = \frac{5}{2} = 2\frac{1}{2}$$

$$5 \times 3 = \frac{15}{17\frac{1}{2}}$$

$$\begin{array}{r} 5 \\ 3\frac{1}{2} \\ \hline 5 \times 3 = 15 \\ 5 \times \frac{1}{2} = 2\frac{1}{2} \\ \hline \text{Ans. } 17\frac{1}{2} \end{array}$$

15. Multiply  $3\frac{1}{2}$  by  $5\frac{1}{2}$ .

$$3\frac{1}{2} = \frac{7}{2}$$

$$5\frac{1}{2} = \frac{11}{2}$$

$$\frac{7}{2} \times \frac{11}{2} = \frac{77}{4} = 19\frac{1}{4} \text{ Ans.}$$

Multiply

16.  $18\frac{1}{2}$  by 3 | 18. 142 by  $12\frac{1}{4}$  | 20. 234 by  $18\frac{1}{2}$

17.  $47\frac{3}{4}$  by 5 | 19. 1720 by  $10\frac{1}{2}$  | 21.  $6\frac{3}{4}$  by  $3\frac{1}{2}$

22.  $8\frac{1}{8}$  by  $4\frac{7}{8}$  | 23.  $4\frac{1}{8}$  by  $\frac{3}{4}$  of  $\frac{3}{4}$  of  $10\frac{1}{2}$

24. What will  $45\frac{3}{4}$  yards of cloth cost at 36 cents per yard?

25. If a man can run a mile in  $4\frac{1}{2}$  minutes, how long will it take him to run  $6\frac{3}{4}$  miles?

26. What will  $8\frac{7}{12}$  dozen pens cost at  $18\frac{3}{4}$  cents per dozen?



## DIVISION OF FRACTIONS.

### CASE I.

75. To divide a fraction by a whole number.

**Rule 1.**—Divide the numerator of the fraction by the whole number when it can be done without a remainder, and write the quotient over the denominator.

**Rule 2.**—Multiply the denominator of the fraction by the whole number, and over the whole product write the numerator.

When mixed numbers are to be divided, either divide the whole number and the fraction separately, and write the results, or, change the mixed number to an improper fraction.

## EXAMPLES.

1. Divide
- $\frac{2}{3}$
- by 2.

FIRST RULE.

$$\frac{2}{3} \div 2 = 2 \div 2 = \frac{1}{3} \text{ Ans.}$$

SECOND RULE.

$$\frac{2}{3} \times 2 = \frac{2}{6} = \frac{1}{3}$$

Divide

2.  $\frac{8}{11}$  by 4

6.  $\frac{3}{4}$  by 2

10.  $42\frac{1}{2}$  by 3

3.  $\frac{1}{2}$  by 6

7.  $\frac{1}{2}$  by 2

11.  $43\frac{1}{2}$  by 3

4.  $\frac{2}{3}$  by 10

8.  $\frac{2}{3}$  by 6

12.  $67\frac{1}{4}$  by 6

5.  $\frac{2}{3}$  by 80

9.  $\frac{1}{8}$  by 10

13.  $184\frac{3}{4}$  by 18.

## CASE II.

## 76. To divide a fraction by a fraction.

*Rule.*—Invert the divisor, and multiply as in multiplication of fractions. (Art. 72, page 42.)

Mixed or whole numbers should first be changed to improper fractions.

## EXAMPLES.

1. Divide
- $\frac{1}{2}$
- by
- $\frac{1}{2}$
- .

$$\frac{1}{2} \text{ inverted} = \frac{2}{1}$$

$$\frac{1}{2} \times \frac{2}{1} = \frac{2}{2} = 1 \text{ Ans.}$$

2. Divide
- $\frac{3}{10}$
- by
- $2\frac{1}{2}$
- .

$$\frac{2\frac{1}{2}}{\frac{5}{2}} = \frac{5}{2} \text{ inverted} = \frac{2}{5}. \quad \frac{3}{10} \times \frac{2}{5} = \frac{6}{50} = \frac{3}{25} \text{ Ans.}$$

3. Divide
- $3\frac{1}{5}$
- by
- $4\frac{1}{4}$
- .

$$3\frac{1}{5} = \frac{16}{5}, 4\frac{1}{4} = \frac{17}{4}. \quad \frac{16}{5} \times \frac{4}{17} = \frac{64}{85} \text{ Ans.}$$

Divide

4.  $\frac{2}{3}$  by  $\frac{3}{4}$

8.  $\frac{1}{4}$  by  $2\frac{1}{2}$

12.  $6\frac{3}{4}$  by  $\frac{3}{4}$

5.  $\frac{7}{8}$  by  $\frac{3}{11}$

9.  $\frac{1}{2}$  of  $\frac{4}{7}$  by  $\frac{2}{3}$

13.  $2\frac{3}{4}$  by  $1\frac{1}{4}$

6.  $\frac{2}{17}$  by  $\frac{8}{15}$

10.  $\frac{6}{13}$  of  $\frac{8}{9}$  by  $\frac{7}{10}$

14.  $18\frac{8}{9}$  by  $4\frac{1}{9}$

7.  $\frac{1}{20}$  by  $\frac{1}{10}$

11.  $4\frac{1}{2}$  by  $\frac{1}{4}$  of  $\frac{3}{19}$

15.  $\frac{2}{3}$  of  $13\frac{3}{4}$  by  $\frac{1}{2}$  of  $12\frac{2}{3}$

16. If  $12\frac{1}{2}$  yards cost \$19.89, what did 1 yard cost?
17. If  $3\frac{1}{2}$  yards of cloth are required for a coat, how many coats can be made out of 35 yards?
18. If  $35\frac{2}{3}$  acres cost 1301 $\frac{1}{2}$  dollars, what was the price per acre?

**Note.**—When the dividend is changed from a mixed number to an improper fraction, if the remainder is required, it should be changed to a whole or mixed number.

**Examples.**—If 192 is divided by  $5\frac{1}{2}$ , the quotient is  $36\frac{1}{2}$ ; but if instead of the fraction  $\frac{1}{2}$  the whole number and the remainder are required, 12, which is the number of *fourths* remaining, must be changed to a whole number, giving 36 as the quotient and 3 as the remainder.



## COMPLEX FRACTIONS.

**77. Complex Fractions**, properly speaking, are not fractions. They are only expressions arranged in a fractional form, indicating division to be performed, the dividend being placed as the numerator of a fraction, and the divisor as the denominator.  $6 \div 3, 3 \overline{)6}$ , or  $\frac{6}{3}$ , all have the same meaning. The process for simplifying the form of complex fractions is the same as in the division of fractions.

### EXAMPLES.

$$\frac{\frac{3\frac{1}{2}}{\frac{2}{3}}}{\frac{6\frac{2}{3}}{\frac{2}{3}}} \quad 3\frac{1}{2} = \frac{7}{2}, \quad 6\frac{2}{3} = \frac{20}{3}, \quad \frac{7}{2} \div \frac{20}{3} = \frac{21}{40} \text{ Ans.}$$

**78. To find what part one number is of another.**

**Rule.**—Write the number denoting the whole as the denominator, and the number denoting the part as the numerator. Then reduce the fraction so obtained to its simplest form.

### EXAMPLES.

1. What part of 4 is 3? *Ans.*  $\frac{3}{4}$ .
2. What part of 12 is 8? *Ans.*  $\frac{8}{12} = \frac{2}{3}$ .
3. What part of 10 is 3, of 24 is 18, of 36 is 48?

79. To find a number when a fractional part is given.

*Rule.*—Divide the given number by the fraction.

#### EXAMPLES.

1. 6 is  $\frac{2}{3}$  of what number?

$$6 \times \frac{3}{2} = \frac{18}{2} = 9 \text{ Ans.}$$

Find the numbers of which

2. 18 is  $\frac{2}{3}$

5. 42 is  $\frac{6}{7}$

8. 48 is  $1\frac{1}{2}$

3. 25 is  $\frac{5}{8}$

6.  $16\frac{2}{3}$  is  $\frac{1}{3}$

9. 175 is  $3\frac{1}{2}$

4. 18 is  $\frac{2}{10}$

7.  $87\frac{1}{2}$  is  $\frac{1}{18}$

10. 84 is  $\frac{1}{2}$  of  $\frac{1}{4}$



#### MISCELLANEOUS EXAMPLES.

1. A man bought two pieces of cloth, one containing  $35\frac{1}{2}$  yards and the other  $42\frac{3}{4}$ , what did they cost at  $3\frac{1}{2}$  dollars per yard?

2. Subtract the sum of  $\frac{2}{3}$  of 91 and  $49\frac{1}{2}$  times  $67\frac{2}{3}$  from  $\frac{1}{11}$  of  $428\frac{1}{2}$ .

3. Divide  $1845\frac{1}{2}$  by  $\frac{2}{3}$  of  $\frac{6}{20}$  of  $316\frac{3}{8}$ .

4. Divide the sum of  $42\frac{7}{15}$ ,  $29\frac{1}{3}$ ,  $\frac{2}{3}$  of  $\frac{1}{3}$ , and  $620\frac{1}{8}$  by 3 times  $\frac{1}{3}$  of  $\frac{1}{4}$ .

5. What part of 250 is  $16\frac{2}{3}$ ? What part of 95 is  $\frac{3}{2}$ ?

6. A man sold  $\frac{1}{2}$  his farm, then  $\frac{1}{10}$ , then  $\frac{1}{12}$ , then  $\frac{1}{25}$ , what portion of the whole did he have left?

7. A and B together own a sum of money. A owns  $\frac{1}{2}$  and B the rest, amounting to \$3300, what part did B own of the whole, and how much was it?

8. The difference between two fractions is  $\frac{1}{3}$ . If the smaller fraction is  $\frac{2}{3}$ , what is the larger?

9. A man owned  $\frac{3}{2}$  of a vessel and sold  $\frac{2}{3}$  of his share for \$2800, what was the whole vessel worth at the same rate?

10. A owned  $\frac{1}{8}$  of a vessel, which he sold for \$3360. B owns  $\frac{1}{3}$  of the same vessel, which he wishes to sell at the same rate, what must be B's price?

## DECIMALS.

80. If we multiply or divide both the numerator and denominator of a fraction by the same number, the value of the fraction is not changed. This principle enables us in many cases to change fractions to a more convenient form for use. For instance, if we multiply both terms of  $\frac{1}{2}$  by 10, we have  $\frac{5}{10}$ . Now if we divide both terms by 2, which is the integer in the denominator, we have  $\frac{5}{10}$ , and if instead of writing the denominator we indicate it merely by placing a point before the numerator, thus .5, we have what is termed a decimal (from the Latin word *decem*, meaning ten), which is a fraction whose denominator is not written, but which is always some power of ten, having as many ciphers in the denominator as there are decimal places at the right of the point in the numerator, with 1 prefixed to the ciphers. Thus  $.5 = \frac{5}{10}$ ,  $.42 = \frac{42}{100}$ ,  $.625 = \frac{625}{1000}$ , and so on.

It is not necessary to go through the whole process as above in order to change common fractions to decimals. We can dispense with multiplying and dividing the denominator, and proceed as in the following rule:

## 81. To change common fractions to decimals.

**Rule.**—Annex ciphers to the numerator and divide by the denominator. Point off, counting from the right, as many decimal places as there have been ciphers annexed. Should there not be places enough, prefix ciphers.

**Note.**—When the division does not terminate exactly, the remainder may be written as a common fraction or the symbol + annexed to show that the division is not complete. Thus  $14.33+$ , or  $14.33\frac{1}{3}$ . For most purposes four or five places are generally sufficient. Ciphers at the right of decimals do not affect their value.

## EXAMPLES.

1. Change  $\frac{1}{4}$  to a decimal.

$$100 \div 4 = 25. \text{ Ans. } .25 = \frac{25}{100}$$

2. Change  $\frac{1}{20}$  to a decimal.

$$100 \div 20 = 5 \quad \frac{05}{100} \quad \text{Ans. } .05.$$

3. Change the following to decimals:  $\frac{1}{5}, \frac{1}{8}, \frac{3}{16}, \frac{2}{125}, \frac{3}{8}, \frac{5}{8}, \frac{3}{20}, \frac{2}{3}, \frac{7}{8}, \frac{1}{13}, \frac{1}{2}$  of  $\frac{2}{3}, \frac{1}{25}, \frac{1}{8}, \frac{1}{12}, \frac{1}{16}, \frac{2}{321}, \frac{1}{25}, \frac{3}{120}, \frac{7}{160}$ .

|                 |               |                  |              |
|-----------------|---------------|------------------|--------------|
| $\frac{1}{13}$  | Ans. .076923+ | $10\frac{5}{8}$  | Ans. 10.625  |
| $18\frac{1}{4}$ | Ans. 18.75    | $36\frac{7}{8}$  | Ans. 36.875  |
| $\frac{3}{32}$  | Ans. .09375   | $24\frac{3}{16}$ | Ans. 24.1875 |

82. To change decimals to common fractions.

*Rule.*—Omit the decimal point, and under the decimal write the denominator, which is 1 with as many ciphers annexed as there are places in the numerator. Reduce the fraction to its lowest terms.

#### EXAMPLES.

1. Change .25 to a common fraction.

$$.25 = \frac{25}{100} = \frac{1}{4} \quad \text{Ans.}$$

2. Change .0125 to a common fraction.

$$.0125 = \frac{125}{10000} = \frac{1}{80} \quad \text{Ans.}$$

Change the following decimals to common fractions in their lowest terms:

|           |                      |                           |
|-----------|----------------------|---------------------------|
| 3. .625.  | Ans. $\frac{5}{8}$   | 8. .75                    |
| 4. .3125. | Ans. $\frac{5}{16}$  | 9. .025 and .0315         |
| 5. .008.  | Ans. $\frac{1}{125}$ | 10. .01875, .00625, .0105 |
| 6. .875   |                      | 11. .375, .0875           |
| 7. .375   |                      |                           |

12. Express as mixed numbers 14.875,  $36.62\frac{1}{2}$ , 45.1875.

13. Change  $\frac{4}{20}$  to a decimal.

14. Change  $.33\frac{1}{3}$  to a common fraction.

15. Which is the most,  $\frac{2}{3}$  or .63?

16. Change  $.12\frac{1}{2}$  to a common fraction.

17. Change  $.18\frac{1}{4}$  to a common fraction. Change .30, .5, .25,  $.87\frac{1}{2}$ .



## NOTATION AND NUMERATION OF DECIMALS.



**83.** Decimals are read as whole numbers having a denominator, as indicated by the number of places in the numerator. Thus .123 is read one hundred twenty-three thousandths; 100.023 is read one hundred *and* twenty-three thousandths.

Observe that the value of the decimal places decrease from left to right as each are removed from the point, each place being one-tenth of that on the left of it. The first place at the right of the point is tenths, the next hundredths, etc.; thus, .6 is six-tenths, .06 is six-hundredths, .006 is six-thousandths.

*Read the following decimals.*

|           |             |                |
|-----------|-------------|----------------|
| 1. .4     | 6. 27.425   | 11. .020605    |
| 2. .16    | 7. 18.3095  | 12. 8.1019075  |
| 3. .378   | 8. 4.22056  | 13. 95.042565  |
| 4. 2.625  | 9. 13.6075  | 14. 6.29004003 |
| 5. 16.385 | 10. 47.0708 | 15. 17.0000095 |

Write the following as decimals.

- |                       |                        |                         |
|-----------------------|------------------------|-------------------------|
| 1. $\frac{35}{100}$   | 3. $\frac{875}{10000}$ | 5. $\frac{6}{1000}$     |
| 2. $\frac{625}{1000}$ | 4. $\frac{2}{100}$     | 6. $28\frac{1}{100000}$ |
7. Four tenths.
  8. Eighty five-hundredths.
  9. Twelve thousandths.
  10. Three ten-thousandths.
  11. Two millionths.
  12. Sixty and one-thousandth.

In writing decimals, if the number of figures is not equal to all the places denoted by the denominator, the deficiency should be supplied by prefixing ciphers.

As ciphers annexed to decimals do not change their value, they may be changed to a common denominator simply by making the number of places equal by annexing ciphers. Thus, .45 and .375 are changed to a common denominator by annexing a cipher to .45, and we have .450 or  $\frac{450}{1000}$  and  $\frac{375}{1000}$ . (By Art. 65, page 38.) We add fractions of a common denomina-

tor by adding their numerators, and under their sum writing the common denominator. By adding .375 and .450 we have .825. But if we are careful to write the decimals so that one decimal point is directly over another, the ciphers at the right may be omitted and the result will be the same.



## 84. ADDITION OF DECIMALS.

**Rule.**—Write the numbers so that the decimal points shall be in the same vertical line, and that terms of the same order shall be in the same column, as tenths under tenths, hundredths under hundredths, and so on. Add as in whole numbers, and place the decimal points under those in the numbers added.

**Note.**—Before adding, the fractions in complex decimals, if any, must be reduced to decimals to extend at least as far as any other decimal in the numbers to be added. For instance, before adding  $4.6\frac{1}{2}$  to 12.3257 reduce  $4.6\frac{1}{2}$  to 4.6125.

### EXAMPLES.

1. Add 2.5, 16.375, 4.1285, 7.45.

$$\begin{array}{r} 2.5 \\ 16.375 \\ 4.1285 \\ 7.45 \\ \hline \end{array}$$

Ans. 30.4535

2. Add 45.75, 13.625, 19.01, 1.0045, and  $6.12\frac{1}{2}$ . Ans. 85.517.

What is the sum of

3. 4.675, .0007, 33.18, 16.400605, .89? Ans. 55.146305.

4. 125.68030715, 19.3256, 18.475, 1.8135?

5. Add  $\frac{3}{4}$ ,  $\frac{4}{5}$ ,  $\frac{9}{10}$ ,  $3\frac{1}{8}$ ,  $18\frac{1}{10}$  after reducing to decimals.

6. Add 4.25, .625, .1875, .2, .025, and reduce the same decimals in their sum to a common fraction.

7. Add twenty-five hundredths, sixteen thousandths, two thousand, four hundred five ten-thousandths, thirty-six ten-thousandths, thirty thousand, and thirty-six ten-thousandths.

8. What is the total weight of the following: 18.75 tons, 14.5 tons, 28.625 tons, 13.875 tons, and  $48.33\frac{1}{2}$  tons?

## SUBTRACTION OF DECIMALS.



**85. Rule.**—Write the less number under the greater so that the decimal points shall be one under the other, and tenths shall be under tenths, hundredths under hundredths, and so on.

Subtract as in whole numbers, and place the decimal point in the remainder under the decimal points above.

**Note.**—If the minuend should not have as many places as subtrahend, ciphers may be annexed to supply the deficiency.

## EXAMPLES.

1. From 21.45 take 3.625.

$$\begin{array}{r} 21.45 \\ 3.625 \\ \hline \text{Ans. } 17.825 \end{array}$$

2. Subtract 72.125 from 98.0075.

Find the difference between

- |                        |                                  |
|------------------------|----------------------------------|
| 3. 3.189 and 4.20      | 7. .5 and .000475                |
| 4. 180.4193 and 3.1    | 8. 42.25 and 16.62 $\frac{1}{2}$ |
| 5. 11.01 and 2.0035    | 9. 1.426 and .4333 $\frac{1}{3}$ |
| 6. 28.14765 and 7.0007 | 10. 83.001 and .000027           |

11. Reduce to decimals  $\frac{1}{4}$  and  $\frac{7}{8}$ ; find their difference and reduce to a common fraction.

12. From three take twenty-five hundredths.

13. From two take two thousandths.

14. From two and five-tenths take eleven one-hundred-thousandths.

15. From 3 $\frac{5}{8}$  take .00375.

16. From twenty-five hundredths take one hundred twenty-five thousandths.

17. Change  $\frac{3}{8}$  and  $\frac{1}{10}$  to decimals and find their difference.

18. What is the difference between .1875 and  $\frac{4}{16}$ ?

## MULTIPLICATION OF DECIMALS.



**86.** In multiplying common fractions the numerators are multiplied together for a new numerator, and the denominators are multiplied together for a new denominator. When decimals are multiplied, the same result is accomplished by multiplying the numerators together as in common fractions, and merely pointing off enough places to indicate the denominator. As the denominators are always some power of ten, it follows that the product will contain as many decimal places as are in both multiplicand and multiplier. For example,  $1^3_0 \times 1^6_0 = 1^{18}_0$ ,  $1^{25}_{00} \times 1^{5}_{000} = 1^{125}_{00000}$ .

**Rule.**—*Multiply as in whole numbers, and from the right of the product point off as many figures as there are decimal places in both factors.*

*If the product does not contain as many figures as both multiplicand and multiplier, prefix ciphers to supply the deficiency.*

**Note.**—To multiply by 10, 100, 1000, etc., remove the decimal point as many places to the right as there are ciphers in the multiplier, annexing ciphers when necessary.

## EXAMPLES.

1. Multiply .5 by .75.

$$.5 \times .75 = \frac{5}{10} \times \frac{75}{100} = \frac{375}{1000} = .375$$

2. Multiply .435 by .02.

*Ans.* .00870.

3. Multiply 2.48 by 10.

*Ans.* 24.80.

4. Multiply 2.48 by 1000.

*Ans.* 2480.

5. 61.325 by 2.25

8. 3.0025 by .0021

6. 17.62305 by 12.375

9. 365. by .125

7. 35.4265 by 19.225

10. 42.375 by 100, by 1000

11. Multiply three and five-tenths by four hundred seventy-two-thousandths.

12. Change  $\frac{1}{8}$  and  $\frac{3}{4}$  to decimals and find their product. Reduce the product to a common fraction, and compare with the product of the fractions multiplied as given.

13.  $6.25$  by  $3\frac{1}{2}$

15.  $4.62\frac{1}{2}$  by  $12\frac{7}{8}$

14.  $6\frac{3}{8}$  by  $3.7$

16.  $3.001$  by  $9.25$

17. What will  $18\frac{3}{4}$  yards of cloth cost at \$4.50 per yard?

18. How many feet in 1000 pieces, each 3.75 feet in length?

19. What will  $13\frac{2}{3}$  tons of hay cost at \$14.25 per ton?

20. What is the profit on ten thousand pounds of sugar at three-tenths of a cent per pound?



## DIVISION OF DECIMALS.

87. When a common fraction is to be used as a divisor it is first inverted and then multiplied by as in multiplication of fractions. If we write the denominators under the decimals, and then proceed as with common fractions, we find that the dividend contains as many places as the divisor and quotient combined.

Thus  $.875 \div .25 = \frac{875}{1000} \div \frac{25}{100} = \frac{875}{1000} \times \frac{100}{25} = \frac{87500}{250000}$ . Cancelling we have  $\frac{875}{2500} = 3.5$ , which contains 1 decimal, the excess of the decimal places in the dividend over those in the divisor.

When the decimal places in the dividend and divisor are equal.

*Rule I.*—Divide as in whole numbers; the quotient will be in whole numbers.

When the decimal places in the dividend exceed those in the divisor.

*Rule II.*—Divide as in whole numbers, and from the right hand of the quotient point off as many decimals as the decimal places in the dividend exceed those in the divisor.

Should there be a deficiency of figures in the quotient, it must be supplied by prefixing ciphers.

*If there be a remainder, annex ciphers, and continue the division as far as desired, each cipher annexed being equivalent to one more decimal in the dividend.*

When the decimal places in the divisor exceed those in the dividend.

**Rule III.**—*Annex ciphers to the dividend, and proceed as before.*

**Note 1.**—A remainder may be expressed as a fraction or indicated by +; thus  $3.265\frac{2}{3}$  or  $3.265 +$ .

**Note 2.**—To divide a decimal by 10, 100, 1000, etc., remove the decimal point as many places to the left as there are ciphers in the divisor.

**Note 3.**—Complex decimals should be made pure, or both dividend and divisor reduced to a common denominator before dividing.

#### EXAMPLES.

1. Divide .325 by .5.

$$.325 \div .5 = .65 \text{ Ans.}$$

2. Divide 112.5 by 1.25.

$$112.50 \div 1.25 = 90 \text{ Ans.}$$

3. Divide 1.625 by 6.5.

$$\text{Ans. } .25.$$

4. Divide 36.285 by 10.

$$\text{Ans. } 3.6285.$$

5. Divide 156.25 by 6.25.

$$\text{Ans. } 25.$$

6. Divide 234.70525 by 64.25.

$$\text{Ans. } 3.653.$$

7. Divide .8727587 by .162.

8. Divide 6.25 by .1875.

9. Divide  $327\frac{3}{4}$  by 4.

10. 3.672 by .81.

$$\text{Ans. } 4.5333+.$$

11. 7382.54 by 6.4252.

12. 82.426 by 125.45.

13. 175.42 by 36.285.

14. 78.56453 by 4.78.

$$\text{Ans. } 16.436.$$

15. 4.2765 by 25.14

$$18. 2.001 \text{ by } 1.002$$

16. 184.75 by 100

$$19. 14.70\frac{1}{4} \text{ by } 3.18\frac{1}{2}$$

17. 16.56 by 1000

$$20. 3.52275 \text{ by } 3.355$$

21. A gallon of distilled water weighs 8.33888 pounds avoirdupois, how many gallons in 264.326846 pounds?

## UNITED STATES MONEY.



88. As the currency of the United States is expressed in the decimal system, with the dollar as the unit and its subdivisions as tenths, hundredths, and thousandths, all the operations connected with it can be performed as in decimals (page 49). The mill is one thousandth of a dollar, and is written in thousandths place. The dime and cent are considered together as the hundredths of a dollar, and are read as so many cents. The cents therefore occupy two places, and when less than 10 a cipher must be in the place of tenths. Thus, 1 dime is written .10 or as ten cents, 1 cent .01, 1 mill .001.

Dollars are reduced to cents by annexing *two ciphers*, and to mills by annexing *three ciphers*.

Cents to mills by annexing *one cipher*.

Mills are reduced to dollars by pointing off three places, and to cents by pointing off one. Cents are reduced to dollars by pointing off two places.

In notes and checks, cents are usually written in the form of a common fraction, thus \$65 $\frac{37}{100}$ . In accounts, mills are not written; if five or more they are usually counted as one cent and added to the number of cents; if the mills are less than five they are disregarded. \$9.367 would be written \$9.37, and \$4.183 as \$4.18.

## EXAMPLES.

1. Change 43000 mills to dollars. Ans. 43.

Change to dollars and decimals of a dollar.

- |                 |                  |                |
|-----------------|------------------|----------------|
| 2. 32650 mills. | 5. 32615 mills.  | 8. 25 mills.   |
| 3. 82756 mills. | 6. 42001 cents.  | 9. 1002 cents. |
| 4. 3269 cents.  | 7. 796050 mills. | 10. 3 cents.   |

Change—

- |                       |                      |                     |
|-----------------------|----------------------|---------------------|
| 11. \$426 to cents.   | 13. \$18 to mills.   | 15. \$7 to mills.   |
| 12. \$32675 to cents. | 14. \$1325 to mills. | 16. \$200 to cents. |
17. Add \$425.16, \$12.62 $\frac{1}{2}$ , \$24.06, \$187.18 $\frac{1}{2}$ .  
 18. Subtract \$4265.40 from \$8200.94, \$37.87 $\frac{1}{2}$  from \$150.  
 19. Multiply \$16.48 by 9, \$1384.75 by 2.75, \$14.50 by .002.  
 20. Divide \$48.37 $\frac{1}{2}$  by 120, \$56.08 by 95, \$37 $\frac{1}{2}$  by 200.

## MISCELLANEOUS EXAMPLES.



1. How much money is required to pay for the following goods?

|  |  |  |
|--|--|--|
| 32½ yards muslin, @ 16½ cts. per yard.     |  |  |
| 18½ lbs. tea, @ \$1.15 per lb.             |  |  |
| 17½ lbs. coffee, @ 22½ cts. per lb.        |  |  |
| 15½ lbs. lard, @ 16½ cts. per lb.          |  |  |
| 23½ lbs. chrome yellow, @ 37½ cts. per lb. |  |  |
| 19½ feet brass rod, @ 23½ cts. per foot.   |  |  |

2. If a piece of land is worth \$317.50, what is  $\frac{2}{3}$  of it worth? What is  $\frac{3}{4}$ ? What is  $\frac{1}{5}$ ?

3. A man sold  $4\frac{3}{4}$  acres of land for \$320. How much did he receive per acre?

4. A United States or Winchester bushel contains 2150.42 cubic inches, how many cubic inches in  $13\frac{1}{2}$  bushels?

5. An avoirdupois pound is equal to the weight of 27.7015 cubic inches distilled water, how many pounds in 647.326 cubic inches?

6. What is  $\frac{2}{3}$  of  $\frac{5}{7}$  of \$117? of \$585?

7. Bought  $15\frac{1}{4}$  tons Russian hemp for \$4325.50, what was the price per ton?

8. What is the cost of 3 metres gold chain, at \$3.25 per inch, each metre containing 39.371 inches?

9. What is the value of 15 gals. 1 qt. 1 pt. of wine, at \$3.75 per gallon?

10. A Troy pound is equal to the weight of 22.7944 cubic inches distilled water, how many pounds in 356.89726 cubic inches?



## CONTRACTIONS IN MULTIPLICATION AND DIVISION.

The following contractions are useful for imparting readiness and dexterity in the mechanical processes of multiplication and division. If thoroughly mastered, they will be found to be of great service, and will amply repay the time and labor expended in acquiring them. They include, in a condensed form, nearly all of practical value that has yet been published, including some methods which, it is believed, appeared in print for the first time in this work, and which have been quite extensively copied without credit or comment.

The labor of making out bills and invoices, entering sales, taking account of stock, and many similar operations, may be much lessened by their use ; as extensions can be made without writing out the operations, while the liability to mistakes is diminished, because less labor and fewer figures are employed.

Merely curious or unusual methods have been omitted, and only such are here presented as have been found to be of real value in the requirements of actual business.



## CONTRACTIONS IN MULTIPLICATION.

89. To multiply two numbers of two places each when the units or tens are alike.

*Rule.*—*Multiply units by units ; then, IF THE UNITS ARE ALIKE, multiply the sum of the tens by the units, and the tens by tens. IF THE TENS ARE ALIKE, multiply the sum of the units by the tens, and the tens by tens ; in all cases carrying as usual.*

### EXAMPLES.

1. Multiply 34 by 54.

$$\begin{array}{rcl}
 34 & 4 \times 4 = 16 & \\
 54 & 5 + 3 = 8 \times 4 = 32 + 1 \text{ (carried)} = 33 & \\
 \hline
 1836 & 3 \times 5 = 15 + 3 \text{ (carried)} = 18 &
 \end{array}$$

2. Multiply 45 by 43.

$$\begin{array}{r}
 45 \\
 43 \\
 \hline
 1935
 \end{array}
 \quad
 \begin{array}{l}
 5 \times 3 = 15 \\
 5 + 3 = 8 \times 4 = 32 + 1 \text{ (carried)} = 33 \\
 4 \times 4 = 16 + 3 \text{ (carried)} = 19
 \end{array}$$

3. Multiply 44 by 64

4.      "      32      "      72

5.      "      28      "      18

6.      "      45      "      35

7.      "      123      "      33

8.      "      65      "      55

9.      "      124      "      34

10. Multiply 36 by 34

11.      "      64      "      64

12.      "      35      "      34

13.      "      72      "      73

14.      "      37      "      35

15.      "      45      "      45

16.      "      66      "      66

 $45 \times 45 = 5 \times 4$  with the square of 5 annexed. $75 \times 75 = 8 \times 7$       "      "      5      "

This rule includes the multiplication of two numbers whose units or tens are ones or fives, the squaring of numbers, multiplying when the units are alike and the sum of the tens is ten, &c.

As it is capable of several hundred applications, its value is obvious. A little practice will give the ability to write the products without setting down the figures to be multiplied.

**90. To multiply by numbers, the half, third, or fourth of which is a convenient multiplier.**

*Rule.*—Multiply the half of one number by twice the other, or one-third of one number by three times the other, etc.

Or, multiply one number successively by the factors of the other number.

**EXAMPLES.**

1. Multiply 28 by 16.

$$28 \times 2 = 56$$

$$16 \div 2 = 8$$

$$56 \times 8 = 448$$

**BY SECOND RULE.**

$$16 = 4 \times 4$$

$$28 \times 4 \times 4 = 448$$

2. Multiply 35 by 27.

$$27 \div 3 = 9$$

$$35 \times 3 = 105$$

$$105 \times 9 = 945$$

# CONTRACTIONS IN MULTIPLICATION. 61

This rule is well adapted for mental operations, and is especially applicable to numbers which can easily be changed to tens, hundreds, etc.

3. Multiply 42 by 15.

$$42 \div 2 = 21$$

$$15 \times 2 = 30$$

$$21 \times 30 = 630$$

4. Multiply 76 by 15

9. Multiply 48 by  $13\frac{1}{2}$  = 16 by 40

5. " 134 " 35

10. " 36 "  $22\frac{1}{2}$

6. " 43 " 24

11. " 24 "  $23\frac{1}{2}$

7. " 182 " 18

12. " 136 " 45

8. " 56 " 28

13. " 28 "  $17\frac{1}{2}$

$$56 \times 4 = 224, 28 \div 4 = 7, 224 \times 7 = 1568$$

14. What will 36 yds. of silk cost at \$1.45 per yard ?

15. What will 49 lbs. of sugar cost at 14 cents per lb. ?

16. How many gallons in 32 bbls., each holding  $40\frac{1}{2}$  gallons ?

91. To multiply when one part of the multiplier is a factor or multiple of the other.

*Rule.*—Multiply by the smaller part of the multiplier; then multiply the product so obtained by the number which shows how many times this smaller part is contained in the other, placing the right-hand figure of the second product under the right-hand figure of that part of the multiplier to which it belongs.

## EXAMPLES.

1. Multiply 285 by 164.

$$16 \div 4 = 4$$

$$285$$

$$164$$

$$1140 \text{ product by } 4$$

$$4560 \text{ 4 times the product by } 4$$

$$46740 = 285 \times 164$$

2. Multiply 654 by 436.

$$654$$

$$436$$

$$2616 \text{ product by } 4$$

$$23544 \text{ 9 times the product by } 4$$

$$285144 = 654 \times 436$$

## 62 CONTRACTIONS IN MULTIPLICATION.

|                        |                        |
|------------------------|------------------------|
| 3. Multiply 364 by 126 | 9. Multiply 235 by 424 |
| 4.    "     387 " 279  | 10.   "     644 " 321  |
| 5.    "    4267 " 142  | 11.   "     342 " 535  |
| 6.    "     276 " 357  | 12.   "     822 " 642  |
| 7.    "     812 " 426  | 13.   "     545 " 927  |
| 8.    "     373 " 369  | 14.   "     847 " 729  |

### 92. To multiply by any number ending with 9.

*Rule.*—Multiply by the next higher number, and subtract the multiplicand.

#### EXAMPLES.

|                         |                                 |
|-------------------------|---------------------------------|
| 1. Multiply 42 by 39.   | 4. Multiply 125 by 699          |
| $39 + 1 = 40$           | 5.   "     175 " 290            |
| $42 \times 40 = 1680$   | 6.   "     325 " 999            |
| $1680 - 42 = 1638$ Ans. | 7.   "     424 " $9\frac{1}{2}$ |
| 2. Multiply 45 by 90    | 8.   "     36 " $68\frac{1}{2}$ |
| 3.    "     432 " 59    | 9.   "     20 " $7\frac{1}{2}$  |

### 93. To multiply by any number of two figures, one of which is 1.

*Rule.*—Multiply by the larger figure in the multiplier, and besides the number to be carried add that figure in the multiplicand which is next on the same side of the figure multiplied that the larger figure is on the side of 1 in the multiplier. If 1 is the unit figure in the multiplier, the right-hand figure of the multiplicand must also be written at the right-hand figure of the product. If 1 is the tens figure in the multiplier, the figure on the left of the multiplicand, after adding the number to be carried from the last multiplication, if any, must be written as the left-hand figure of the product.

*Note.*—When multiplying, if the largest figure is on the left of 1, the figure in the product is one place left of the figure multiplied; if the largest figure is on the right of 1, the figure in the product is directly under the figure multiplied.

EXAMPLES.

1. Multiply 5234 by 41.

$$\begin{array}{r} 5234 \\ 41 \\ \hline 214594 \end{array}$$

**Explanation.**—4 is the right-hand figure in the multiplicand, and is placed at the first figure in the product; then  $4 \times 4 + 3$  (the figure on the left of that multiplied) = 19,  $3 \times 4 + 1$  (carried) + 2 = 15,  $2 \times 4 + 1 + 5 = 14$ ,  $5 \times 4 + 1 = 21$ .

2. Multiply 5234 by 14.

$$\begin{array}{r} 5234 \\ 14 \\ \hline 73276 \end{array}$$

**Explanation.**— $4 \times 4 = 16$ ,  $3 \times 4 + 1$  (carried) + 4 (the figure on the right of that multiplied) = 17,  $2 \times 4 + 1 + 3 = 12$ ,  $5 \times 4 + 1 + 2 = 23$ , 2 (carried) + 5 = 7.

Multiply

3. 12574 by 31

6. 437682 by 14

9. 374675 by 18

4. 256237 by 21

7. 892746 by 16

10. 6384921 by 19

5. 64235 by 51

8. 487968 by 15

11. 37584623 by 17

94. To multiply by any two figures at once.

**Rule I.**—Multiply both figures in the multiplier by each figure in the multiplicand separately. Or,

**Rule II.**—Multiply units by units; then to the product of each succeeding figure in the multiplicand by the units of the multiplier, add the product of the figure preceding it by the tens, and carry as usual. Multiply the last figure of the multiplicand by the tens of the multiplier.

**Note.**—When large numbers are to be multiplied, for the purpose of remembering which figure has been used, place a dot over each figure of the multiplicand as soon as multiplied.

EXAMPLE UNDER RULE I.

Multiply 3265 by 24.

$$\begin{array}{r} 3265 \\ 24 \\ \hline 78360 \end{array} \quad \begin{array}{l} 24 \times 5 = 120, 24 \times 6 = 144 + 12 \text{ (carried)} \\ \quad = 156 \\ 24 \times 2 = 48 + 15 \text{ (carried)} = 63, 24 \times 3 + \\ \quad 6 \text{ (carried)} = 78 \end{array}$$

## 64 CONTRACTIONS IN MULTIPLICATION.

### EXAMPLES UNDER RULE II.

1. Multiply 34 by 43.

$$\begin{array}{r}
 43 \\
 34 \\
 \hline
 1462
 \end{array}
 \begin{array}{l}
 3 \times 4 = 12, \text{ write } 2 \\
 4 \times 4 + 1 = 6 + 1 \text{ (carried)} = 17 \text{ to carry} \\
 3 \times 3 = 9 + 17 = 26, \text{ write } 6 \\
 4 \times 3 = 12 + 2 = 14
 \end{array}$$

2. Multiply 212121 by 23.

$$\begin{array}{r}
 212121 \\
 23 \\
 \hline
 4878783
 \end{array}
 \begin{array}{cccccc}
 2 & 1 & 2 & 1 & 2 & 1 \\
 & & & & & 23
 \end{array}$$

|              |              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|--------------|
| $2 \times 3$ | $1 \times 3$ | $2 \times 3$ | $1 \times 3$ | $2 \times 3$ | $1 \times 3$ |
| $2 \times 2$ | $1 \times 2$ | $2 \times 2$ | $1 \times 2$ | $2 \times 2$ | $1 \times 2$ |

Ans. 4 8 7 8 7 8 3

With a little practice, the products may be written without the trouble of writing the numbers under each other, which often, as in making out invoices, entering sales, etc., effects a considerable saving of time. When thoroughly understood, the liability to mistakes is less than by the ordinary method, because there are fewer operations.

3. Multiply 42 by 14

4. " 36 " 16

5. Multiply 63 by 31

6. " 26 " 51

Find the answers to the following by multiplying the numbers as they stand without writing the numbers :—

|                    |                    |              |
|--------------------|--------------------|--------------|
| 24 yards calico    | @ 14c. per yd.     | Ans. \$3.36. |
| 52 lbs. sugar      | @ 17c. per lb.     | "            |
| 36 bus. oats       | @ 51c. per bus.    | "            |
| 48 bus. corn       | @ 63c. per bus.    | "            |
| 362 yds. carpeting | @ 77c. per yd.     | "            |
| 28 lbs. tea        | @ 74c. per lb.     | "            |
| 72 yds. muslin     | @ 42c. per yd.     | "            |
| 34 gross pens      | @ 85c. per gross.  | "            |
| 125 yds. de laine  | @ 75c. per yd.     | "            |
| 240 bus. wheat     | @ \$1.12½ per bus. | "            |
| 84 bbls. apples    | @ \$4.25 per bbl.  | "            |
| 26 doz. eggs       | @ 18c. per doz.    | "            |
| 65 lbs. butter     | @ 35c. per lb.     | "            |
| 480 yds. velvet    | @ \$1.37½ per yd.  | "            |
| 86 gals. oil       | @ 24c. per gal.    | "            |

95. To multiply when the multiplier is a convenient or aliquot part of 10, 100, 1000, etc.

*Rule.*—Annex as many ciphers to the multiplicand as there are in the number of which the multiplier is an aliquot part; then

Take such part of the multiplicand so increased, as the multiplier is of the number of which it is an aliquot part.

EXAMPLES.

1. Multiply 424 by 25.

$$25 = \frac{1}{4} \text{ of } 100. \quad 42400 \div 4 = 10600.$$

2. Multiply 4936 by  $12\frac{1}{2}$ .

$$12\frac{1}{2} = \frac{1}{8} \text{ of } 100. \quad 493600 \div 8 = 61700.$$

| ALIQOT PARTS<br>OF 10.       | ALIQOT PARTS<br>OF 100.           | ALIQOT PARTS<br>OF 1000.                        |
|------------------------------|-----------------------------------|---|
| $2\frac{1}{2} = \frac{1}{4}$ | $6\frac{1}{4} = \frac{1}{16}$     | $18\frac{3}{4} = \frac{3}{16}$                  |
| $3\frac{1}{3} = \frac{1}{3}$ | or $\frac{1}{4}$ of $\frac{1}{4}$ | or $\frac{1}{8} + \frac{1}{2}$ of $\frac{1}{8}$ |
| $1\frac{2}{3} = \frac{2}{3}$ | $8\frac{1}{2} = \frac{1}{12}$     | $31\frac{1}{4} = \frac{5}{8}$                   |
| $1\frac{3}{4} = \frac{1}{4}$ | or $\frac{1}{8}$ of $\frac{1}{4}$ | $37\frac{1}{2} = \frac{3}{8}$                   |
| $1\frac{1}{4} = \frac{1}{8}$ | $12\frac{1}{2} = \frac{1}{8}$     | $62\frac{1}{2} = \frac{5}{8}$                   |
| $1\frac{1}{5} = \frac{1}{5}$ | $14\frac{2}{7} = \frac{1}{7}$     | $66\frac{2}{3} = \frac{2}{3}$                   |
|                              | $16\frac{2}{3} = \frac{1}{6}$     | $75 = \frac{3}{4}$                              |
|                              | $25 = \frac{1}{4}$                | $83\frac{1}{3} = \frac{5}{6}$                   |
|                              | $33\frac{1}{3} = \frac{1}{3}$     | $87\frac{1}{2} = \frac{7}{8}$                   |
|                              |                                   | $83\frac{1}{3} = \frac{1}{12}$                  |
|                              |                                   | $125 = \frac{1}{8}$                             |
|                              |                                   | $166\frac{2}{3} = \frac{1}{3}$                  |
|                              |                                   | $250 = \frac{1}{4}$                             |
|                              |                                   | $333\frac{1}{3} = \frac{1}{3}$                  |
|                              |                                   | $375 = \frac{3}{8}$                             |
|                              |                                   | $625 = \frac{5}{8}$                             |
|                              |                                   | $833\frac{1}{3} = \frac{5}{6}$                  |
|                              |                                   | $875 = \frac{7}{8}$                             |

This table can also be used to show the value of an aliquot part. For example,  $\frac{1}{5}$  of 1000 equal 625;  $\frac{1}{8}$  of 100 = 83 $\frac{1}{3}$ .

3. Multiply 48 by  $2\frac{1}{2}$

4. " 18 "  $3\frac{1}{3}$

5. " 384 "  $12\frac{1}{2}$

6. " 486 "  $16\frac{2}{3}$

7. " 165 "  $33\frac{1}{3}$

8. " 96 "  $1\frac{1}{2}$

9. Multiply 320 by  $6\frac{1}{4}$

10. " 840 "  $8\frac{1}{2}$

11. " 225 "  $14\frac{2}{3}$

12. " 648 " 125

13. " 726 "  $166\frac{2}{3}$

14. " 2456 "  $37\frac{1}{2}$

## 66 CONTRACTIONS IN MULTIPLICATION.

What is the cost of  $12\frac{1}{2}$  yds. cloth @  $18\frac{1}{4}$  c. per yd. ?

$$12\frac{1}{2} = \frac{1}{8}; \text{ change } \frac{3}{4} \text{ to a decimal, } 18.75 \div 8 = \$2.34\frac{3}{8}.$$

96. Aliquot parts may be conveniently used when the multiplier is but little more or less than an aliquot part.

### EXAMPLES.

1. Multiply 24 by  $17\frac{2}{3}$ .

$$17\frac{2}{3} = 16\frac{2}{3} + 1 \quad 16\frac{2}{3} = \frac{1}{6}$$

$$24 \times 16\frac{2}{3} = 400$$

$$24 \times 1 = 24$$

$$424 \text{ Ans.}$$

2. Multiply 36 by  $18\frac{1}{2}$

3. " 48 "  $13\frac{1}{2}$

4. " 33 " 24

5. " 36 "  $34\frac{1}{2}$

97. To multiply mixed numbers in which the fractions are alike.

**Rule.**—To the product of the whole numbers add that part of their sum which is expressed by the fraction, and the product of the fraction multiplied by itself.

**Note.**—Perform the operation mentally whenever it can be done.

### EXAMPLES.

1. Multiply  $6\frac{1}{2}$  by  $4\frac{1}{2}$ .

$$6 \times 4 = 24$$

$$\frac{1}{2} \text{ of } (6 + 4) = 5$$

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \quad 29\frac{1}{4} \text{ Ans.}$$

2. Multiply  $8\frac{1}{4}$  by  $4\frac{1}{4}$

3. "  $6\frac{1}{2}$  "  $9\frac{1}{2}$

4. "  $8\frac{1}{2}$  "  $4\frac{1}{2}$

5. "  $7\frac{1}{2}$  "  $8\frac{1}{2}$

6. "  $4\frac{1}{2}$  "  $4\frac{1}{2}$

7. "  $6\frac{1}{2}$  "  $6\frac{1}{2}$

8. Multiply  $12\frac{1}{4}$  by  $3\frac{1}{4}$

$$\frac{1}{4} \text{ of } 15 = 3\frac{3}{4}, \quad \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$$

$$\frac{3}{4} + \frac{1}{16} = \frac{13}{16} \quad \text{Ans. } 39\frac{13}{16}$$

9. Multiply  $16\frac{1}{2}$  by  $9\frac{1}{2}$

10. "  $8\frac{1}{2}$  "  $6\frac{1}{2}$



When the whole numbers are alike, and the fraction is one-half, the half of the sum of the whole numbers equals one of the numbers, and the operation can be shortened by multiplying the whole number by itself plus 1, and annexing  $\frac{1}{2}$  :—

$$4\frac{1}{2} \times 4\frac{1}{2} = 5 \times 4 + \frac{1}{2} = 20\frac{1}{2}.$$

This rule will apply to whole numbers, by taking the units as so many parts of ten, and the tens as so many parts of one hundred. Thus, to multiply 45 by 45: 40 equals 4 tens, 5 equals one-half of ten, and one-fourth of one hundred equals 25; then,  $5 \times 4 = 20$ , to which annex  $\frac{1}{4}$  of 100, that is, 25, and we have 2025. This is included in Art. 89.

- |                           |                             |
|---------------------------|-----------------------------|
| 11. Multiply 65 by 65     | 14. Multiply 650 by 650     |
| 12.     "    35   "    35 | 15.     "    450   "    450 |
| 13.     "    75   "    75 | 16.     "    850   "    850 |

98. To multiply mixed numbers when the whole numbers are alike.

*Rule.*—To the product of the whole numbers add that part of one of them which is expressed by the sum of the fractions, and annex the product of the fractions.

EXAMPLES.

- |  |  |
|--|--|
| 1. Multiply $12\frac{1}{4}$ by $12\frac{1}{4}$ . | 2. Multiply $8\frac{1}{8}$ by $8\frac{1}{8}$ |
| $12 \times 12 = 144$                             | 3.     " $9\frac{1}{4}$ " $9\frac{1}{4}$     |
| $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$        | 4.     " $8\frac{1}{8}$ " $8\frac{1}{8}$     |
| $\frac{3}{4}$ of $12 = 9$                        | 5.     " $6\frac{1}{2}$ " $6\frac{1}{2}$     |
| $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$   | 6.     " $12\frac{1}{8}$ " $12\frac{1}{8}$   |
| <hr/>  | 7.     " $7\frac{1}{2}$ " $7\frac{1}{2}$     |
| $144 + 9 + \frac{1}{8} = 153\frac{1}{8}$ Ans.    | 8.     " $8\frac{1}{4}$ " $8\frac{1}{4}$     |
|  | 9.     " $15\frac{1}{8}$ " $15\frac{1}{8}$   |
|  | 10.    " $4\frac{1}{8}$ " $4\frac{1}{8}$     |

*Note.*—When the sum of the fractions equals one, and the whole numbers are alike, that part of one of them which is expressed by the sum of the fractions is equal to itself, and the operation can be shortened by multiplying the whole number by itself plus 1, and annexing the product of the fractions. Thus  $8\frac{1}{2} \times 8\frac{1}{2} = 9 \times 8 + (\frac{1}{2} \times \frac{1}{2}) = 72\frac{1}{4}$ .  $4.25 \times 4.75 = 4\frac{1}{4} \times 4\frac{3}{4} = 20\frac{3}{16}$  or 20.1875.

## 68 CONTRACTIONS IN MULTIPLICATION.

99. To multiply two numbers which are equidistant from any number which may be squared mentally.

*Rule.*—From the square of the mean number subtract the square of the difference between the mean number and one of the given numbers.

### EXAMPLES.

1. Multiply 98 by 102.

*100, the mean number between 98 and 102;*

*Square of 100 = 10000; 4 = the square of the difference;*

*10000 — 4 = 9996 Ans.*

2. Multiply 32 by 28.

*Square of 30 = 900;*

*900 — 4 = 896.*

3. Multiply 41 by 39.

4. “ 88 by 92.

5. Multiply 37 by 43.

6. “ 46 “ 34.

7. “ 73 “ 87.

8. “ 41 “ 59.

When the sum of the units equals ten, and one of the tens is an odd number and the other is an even number, the numbers are equidistant from some number of tens, which is obtained by taking half of the sum of the tens plus 1.

1. For such examples as the two following, art. 89 is preferable.

9. Multiply 45 by 95.

10. Multiply 35 by 65.

100. This rule includes multiplying by numbers of two places each, when the sum of the units is 10 and the difference of the tens is 1; by numbers the sum of whose units equals 10, and whose tens are alike; mixed numbers, in which the sum of the fractions equals 1, and the difference of the whole numbers is 1.

11. Multiply  $12\frac{1}{2}$  by  $11\frac{1}{2}$ .

*Ans. 143 $\frac{3}{4}$ .*

13. Multiply  $4\frac{1}{4}$  by  $3\frac{3}{4}$ .

14. “ 61 “ 59.

12. Multiply  $7\frac{1}{4}$  by  $6\frac{3}{4}$ .

15. “ 16 “ 84.

16. What will 53 pounds of lead pipe cost at 47 cents per pound?

17. How many square feet in a lot which is 32 feet long and 28 feet wide?

18. How many yards in 17 rolls of paper each 23 yards long?

101. To multiply any mixed numbers.

**Rule.**—Multiply by the fraction of the multiplier, then by the whole number ; or, Change both multiplier and multiplicand to improper fractions or to decimals, and then proceed as in multiplication of fractions.

EXAMPLES.

1. Multiply  $6\frac{1}{3}$  by  $9\frac{1}{2}$ .

$$\begin{array}{r} 6\frac{1}{3} \\ 9\frac{1}{2} \\ \hline 3\frac{1}{6} \text{ prod. by } \frac{1}{2} \\ 3 \quad \text{ " of } \frac{1}{3} \text{ by } 9. \\ 54 \quad \text{ " " 6 " 9.} \end{array}$$

$$\text{Or, } 6\frac{1}{3} = \frac{19}{3} \quad 9\frac{1}{2} = \frac{19}{2}$$

$$\frac{19}{3} \times \frac{19}{2} = \frac{361}{6} = 60\frac{1}{6}$$

Ans.  $60\frac{1}{6}$ .

2. Multiply  $18\frac{3}{4}$  by  $6\frac{1}{2}$ .

3. "  $4\frac{1}{8}$  "  $6\frac{1}{2}$ .

4. "  $5\frac{1}{8}$  "  $7\frac{1}{8}$ .

5. Multiply  $14\frac{1}{2}$  by  $8\frac{1}{2}$ .

6. "  $3\frac{1}{2}$  "  $6\frac{1}{2}$ .

7. "  $9\frac{1}{10}$  "  $2\frac{1}{2}$ .

102. To multiply by numbers which are from 1 to 12 less than 100, 1000, etc.

**Rule.**—Multiply the multiplicand by the difference between the multiplier and 100, 1000, etc., and subtract the product from the product of the multiplicand by 100, 1000, etc.

EXAMPLES.

1. Multiply 35 by 98.

$$98 = 100 - 2$$

$$35 \times 2 = 70$$

$$35 \times 100 = 3500$$

$$3500 - 70 = 3430 \text{ Ans.}$$

2. Multiply 125 by 198.

3. " 205 " 96.

4. " 375 " 89.

5. Multiply 415 by 97.

6. " 624 "  $99\frac{1}{2}$ .

7. " 215 " 98.

**Note.**—When from 1 to 12 more than 100, add the product of the multiplicand by the unit figure, after annexing the required number of ciphers.

$$325 \times 102 = 32500 + 650 =$$

$$33150 \text{ Ans.}$$

8. Multiply 475 by 101, | 9. Multiply 1245 by 99,  
103, 106. | 101, 102.



## CONTRACTIONS IN DIVISION.

103. To divide by an aliquot part of 100, 1000, etc.

*Rule.*—Multiply the dividend by the number which expresses how many times the given divisor is contained in 100, 1000, etc., and point off as many places as there are ciphers in the number divided by the given divisor.

### EXAMPLES.

1. Divide 485 by 25.

$$100 \div 25 = 4$$

$$485 \times 4 = 19.40 \text{ Ans.}$$

2. Divide 8480 by  $12\frac{1}{2}$ .

$$100 \div 12\frac{1}{2} = 8$$

$$8480 \times 8 = 678.40 \text{ Ans.}$$

3. Divide 69600 by  $16\frac{2}{3}$ .

4. Divide 4762000 by  $33\frac{1}{3}$ .

5. " 2875 "  $62\frac{1}{2}$ .

$$62\frac{1}{2} = \frac{5}{8} \text{ of } 100.$$

$$\begin{array}{r} 2875 \\ 8 \end{array}$$

$$\begin{array}{r} 5) 28000 \\ \hline 46.00 \end{array}$$

$62\frac{1}{2} = \frac{5}{8}$  or  $\frac{1}{8}$ : therefore, if the number is multiplied by 4 and the product by 4, and three places be pointed off, the same result will be obtained.

104. Multiplying or dividing both the dividend and divisor by the same number does not alter the quotient.

105. To divide by any number ending in 5, or an aliquot part of 10, or any number of tens.

*Rule.*—Multiply both the dividend and divisor by any number that will make the divisor equal some number of tens or hundreds; then divide as usual.

*Note.*—If there is a remainder, it must be divided by the number by which the dividend was multiplied, to obtain the true remainder.

EXAMPLES.

- |  |   |
|--|---|
| <p>1. Divide 4480 by 35.<br/> <math>35 \times 2 = 70</math><br/> <math>4480 \times 2 = 8960</math><br/> <math>8960 \div 70 = 128</math> Ans.</p> <p>2. Divide 3644900 by 175.<br/> <math>175 \times 4 = 700</math><br/> <math>3644900 \times 4 = 14579600</math><br/> <math>14579600 \div 700 = 20828</math><br/>             Ans.</p> | <p>3. Divide 6785 by 45.</p> <p>4. " 3725 " 75.</p> <p>5. " 628750 by 55.</p> <p>6. " 2628000 by 225,<br/>             by <math>22\frac{1}{2}</math>, <math>17\frac{1}{2}</math>, <math>23\frac{1}{2}</math>, <math>17\frac{1}{2}</math>,<br/> <math>18\frac{1}{2}</math>, or <math>18\frac{3}{4}</math>.</p> <p>7. Divide 625 by <math>12\frac{1}{2}</math>.</p> |
|--|---|

106. To divide by any number greater or less than 10 or 100 by an aliquot part.

*Rule.*—Find what part of the given divisor the difference between it and 10 or 100 equals; then

Increase the dividend by this aliquot part of itself, if the divisor is less, but diminish it if the divisor is more than 10 or 100, and point off as many decimals as there are ciphers in the number of tens taken.

*Note.*—For explanation of this rule see art. 25, page 25. Adding one-third to the dividend and the divisor is the same as multiplying both by  $1\frac{1}{3}$ .

EXAMPLES.

- |   |  |
|---|--|
| <p>1. Divide 3165 by <math>7\frac{1}{2}</math>.<br/> <math>10 - 7\frac{1}{2} = 2\frac{1}{2}</math><br/> <math>2\frac{1}{2} = \frac{1}{3}</math> of <math>7\frac{1}{2}</math><br/>             To 3165<br/>             Add <math>1055 = \frac{1}{3}</math> of 3165<br/> <math>422.0</math> Ans. 422.</p> <p>3. Divide 18764 by <math>66\frac{2}{3}</math>.</p> <p>4. " 2465 " 75.</p> <p>5. " 42736 " <math>83\frac{1}{3}</math>.</p> <p>6. " 37254 " <math>88\frac{2}{3}</math>.</p> | <p>2. Divide 6345 by 15.<br/> <math>15 = 10 + 5</math><br/> <math>5 = \frac{1}{3}</math> of 15<br/>             From 6345<br/>             Subtract <math>2115 = \frac{1}{3}</math> of 6345<br/> <math>423.0</math> Ans. 423.</p> <p>7. Divide 18992 by <math>133\frac{1}{3}</math>.</p> <p>8. " 7462 " <math>166\frac{2}{3}</math>.</p> <p>9. " 4265 " <math>116\frac{2}{3}</math>.</p> <p>10. " 3256 " <math>87\frac{1}{2}</math>.</p> |
|---|--|

107. To divide by any number that can be changed to a convenient divisor by increasing or diminishing it by an aliquot part of itself.

*Rule.*—After dividing by the divisor so increased or diminished, increase or diminish the quotient in the same proportion.

## EXAMPLES.

1. Divide 1920 by 24.

$$\frac{1}{4} \text{ of } 24 = 6 \quad 24 + 6 = 30$$

$$30 \overline{) 1920}$$

$$\frac{1}{4} \text{ of quotient} \quad \frac{64}{16}$$

Ans. 80

2. Divide 1845 by 45.

3. " 3640 " 35.

4. " 2332 " 54.

5. " 1520 " 48.

6. " 7704 " 24.

7. Divide 8317 by 27.

8. " 3116 " 81.

9. " 141120 " 180.

10. " 2400 "  $18\frac{3}{4}$ .

11. " 24500 "  $87\frac{1}{2}$ .



## MISCELLANEOUS EXAMPLES.

1. Multiply 82 by 22.

2. Divide 475 by  $12\frac{1}{2}$ .

3. Multiply 65 by 18.

4. " 121 " 19.

5. " 246 " 71.

6. Divide 342 "  $16\frac{3}{4}$ .

7. Multiply 32 " 97.

8. " 164 " 54.

9. " 2356 " 39.

10. "  $7\frac{1}{2}$  "  $7\frac{1}{2}$ .

11. Multiply  $8\frac{1}{4}$  by  $18\frac{1}{4}$ .

12. " 125 "  $12\frac{1}{2}$ .

13. "  $9\frac{1}{2}$  "  $6\frac{1}{4}$ .

14. Divide 275 by  $33\frac{1}{4}$ .

15. Multiply  $42\frac{1}{2}$  by  $6\frac{1}{4}$ .

16. " 162 " 32.

17. Divide 260 by 85.

18. Multiply 2462 by  $32\frac{1}{2}$ .

19. " 320 " 49.

20. " 18.5 "  $4\frac{1}{2}$ .

## ENTRY CLERK'S DRILL.

Cleveland, O., March 11, 1882.

Messrs. Cook &amp; Armstrong

Bought of C. Harrison &amp; Bro.

|  |         |
|--|---------|
| 43 yds. Ribbed Poplin @ 83 c.  |         |
| 61 yds. Swiss Mull @ 31 c.   |         |
| 26 yds. $\frac{7}{8}$ White Flannel @ 28 c.                                |         |
| 48 yds. Irish Linen @ 45 c.  |         |
| 56 yds. Blk. Silk @ \$2.75   |         |
| 43 gal's Linseed Oil @ 99 c.   |         |
| 384 lbs. Rio Coffee @ 19 c.  |         |
| 246 lbs. Java " @ 21 c.  |         |
| 432 bus. Oats @ 43 c.  |         |
| 17 $\frac{1}{2}$ doz. Eggs @ 18 $\frac{3}{4}$ c.                           |         |
| 10 $\frac{1}{2}$ lbs. Sugar @ 10 $\frac{1}{4}$ c.                          |         |
| 125 $\frac{1}{2}$ lbs. " @ 9 $\frac{1}{2}$ c.                              |         |
| 38 M. Pine Boards @ \$42   |         |
| 16 lbs. Y. H. Tea @ \$1.25   |         |
| 184 lbs $\frac{1}{2}$ in. Iron Bolts, @ 12 $\frac{3}{4}$ c.                | \$23.00 |
| Less 5 % Discount.   | 1.15    |
| 12 doz. Shovels @ \$12.50, 19 doz. do. @ \$18                              |         |
| 5 Boxes Olive Soap ea. 75 lbs. @ 12 c.                                     |         |
| 2 bbls. Granulated Sugar $\frac{257-17}{256-18}$ @ 9 $\frac{3}{4}$ c.      |         |
| 3 doz. Pitchers $\frac{1\frac{1}{2}}{\$1.20}, \frac{1\frac{1}{2}}{\$1.60}$ |         |
| 2 bags Canary Seed, 475 lbs., tare 6 lbs., @ 7 c.                          |         |

Rec'd Payment,

C. Harrison & Bro.,  
per E. G. Barton.

## MONEY, WEIGHTS, AND MEASURES OF THE UNITED STATES.



### MONEY.

108. Money is value, or its representative, used as a medium of exchange and as a standard of measure.

109. The word money is derived from the Latin *monetas*, which some derive from *monere*, to “admonish,” to “inform,”—the stamp on a coin informing the holder of its value. The Latin word *pecunia*, “money,” is supposed to be derived from *pecus*, “a sheep,” because in early times sheep, or stamped skins, were used in place of money.

110. In different countries, and in different conditions of society, various articles have been made to serve as money. Homer tells us the armor of Diomedes cost nine oxen, while that of Glaucus cost one hundred; and the oldest Greek coins were stamped with an ox,—intimating the previous employment of cattle as money. The laws of the ancient Germans imposed penalties for offences, to be paid in cattle; while slaves and cattle—or “living money,” as it was then called—were in common use among the Anglo-Saxons. The Carthaginians and Spartans employed for this purpose skins and pieces of leather marked with a stamp. In Hindostan, small shells called *cowries* are used in the smaller payments; they also circulate widely in Africa. In Abyssinia, rock salt; in Iceland, dried fish, and among the North American Indians, the *belt of wampum*, is used as money. In 1776, according to Adam Smith, the workmen of a certain Scottish village carried nails as money to the baker’s and to the ale-house.

111. Various metals have been used: the Spartans adopted iron; the ancient Romans, copper; the Russians, at one time, platinum; but gold and silver have been preferred by modern nations, as best adapted for the purposes of money, for the following reasons:

I. Their value is comparatively uniform, and less subject to



variations, and they may be kept or used without much deterioration. II. Their nature is such that they can easily be identified. III. They are capable of division or combination without loss of value. IV. They possess great value in small compass, and are capable of being easily transported from place to place.

Gold and silver, in their purity, are soft, easily bent or injured, and exposed to rapid wear: they are therefore moderately hardened by the admixture of an alloy. For gold coin both copper and silver are employed as an alloy; and the color of the coin inclines to yellow or red, as the silver or copper may predominate.

112. Money is either *real* or *imaginary*. Real money includes all coins, such as dollars, sovereigns, and the like. Imaginary or nominal money, is that which does not exist in specie, such as mills, pounds, etc.

113. The **moneys of account** are those in which accounts are kept, and include imaginary as well as real money; but the relations of the denominations are not susceptible to fluctuations, like currency.

114. **Paper money** is a substitute for metallic currency.

115. Aside from the amount in actual existence, *the rapidity and value of exchanges* affect the abundance or scarcity of money. Any thing which dispenses with its use diminishes the amount of circulating medium necessary for a community, and in effect is the same as adding so much to the currency. The accounts of merchants, notes, bills of exchange, and credits generally, are of this nature. Of the business in banks, only about three-fourths of one per cent. of it is transacted with gold and silver.

116. When two kinds of money are in circulation, the one of least value will displace the other.

117. The term **bullion** is applied to uncoined gold or silver, and includes gold dust, amalgamations, and ingots, or bars.

118. **Coin, or Specie**, is metal of known weight and fineness, stamped for the purpose of being used as money.

119. The smallest coin is believed to be the Turkish *para*, weighing from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  grains, containing a small portion of silver, and its value is one-thirtieth of our cent. The smallest

## 76 MONEY, WEIGHTS, AND MEASURES, ETC.

copper coin of Europe is the *centime* of Genoa, weighing fourteen grains, and worth one-twelfth of our cent. The *tencoepek* piece of Russia is equal in weight to  $4\frac{1}{2}$  copper cents; a copper piece of 1795 weighs 890 grains; about as heavy as  $5\frac{1}{2}$  copper cents.

120. **Currency** is money in common circulation, whether coin or paper.

121. **Legal Tender** is the kind of money which the law requires to be accepted in payment of debts.

122. **Billon** (from the French, signifying base coin) is the name of a mixture having a small proportion of silver combined with some base metal.

123. **Tokens** are coins whose intrinsic value is below that assigned to them by law, and are not a legal tender above certain small amounts. Coins in billon—the nickel cent, and the one, two, three, and five cent pieces of 1866—are tokens. (See *Value of U. S. Coins.*)

### RELATIVE VALUES OF GOLD AND SILVER.

|                          |          |    |    |
|--------------------------|----------|----|----|
| In the United States, as | 15.988   | to | 1. |
| " England,               | " 15.60  | "  | 1. |
| " France, Germany,       | " 15.50  | "  | 1. |
| " Spain, Austria,        | " 15.075 | "  | 1. |
| " China,                 | " 14.25  | "  | 1. |
| " Russia,                | " 15.30  | "  | 1. |

### GOLD AND SILVER COIN.

DECEMBER, 1880.

|                             |                   |                      |               |
|-----------------------------|-------------------|----------------------|---------------|
| In the United States, Gold, | . . . . .         | \$375,323,881        |               |
| Silver, {                   | National coin,    | 72,429,794           |               |
|                             | Standard dollars, | 72,847,750           |               |
|                             | Trade dollars,    | 7,000,000            |               |
|                             |                   | <u>152,277,544</u>   | \$527,601,425 |
| In Great Britain, {         | Gold,             | 596,019,721          |               |
|                             | Silver,           | 92,546,231           | 688,565,952   |
|                             |                   | <u>688,565,952</u>   |               |
| In France, {                | Gold,             | 927,000,000          |               |
|                             | Silver,           | 598,686,000          | 1,525,686,000 |
|                             |                   | <u>1,525,686,000</u> |               |
| In Germany, {               | Gold,             | 333,200,000          |               |
|                             | Silver,           | 211,106,000          | 544,306,000   |
|                             |                   | <u>544,306,000</u>   |               |
| In the World, {             | Gold,             | 2,700,000,000        |               |
|                             | Silver,           | 6,700,000,000        | 9,400,000,000 |
|                             |                   | <u>9,400,000,000</u> |               |

PAPER MONEY.

|   |               |
|---|---------------|
| In Great Britain and Ireland, . . . . . | \$235,000,000 |
| In France, . . . . .                    | 495,000,000   |
| In Germany, . . . . .                   | 200,000,000   |
| In the United States, . . . . .         | 675,000,000   |

WEIGHTS AND MEASURES.

124. The weights and measures used by the different nations throughout the world have been derived from very imperfect and variable standards. Thus, a foot was the length of a king's foot, and, consequently, varied as a king with a long foot or a short foot happened to reign. The *hand*, *span*, *cubit*, or forearm, and *fathom*, or length of the two arms extended, all varied with the size of the person. Henry I., King of England, declared that the ell, or ulna, or yard, should be the length of his own arm, from the extreme end of the longest finger to the middle of the breast, and that the other measures should be raised upon this. The old English pound, which was the legal standard of weight from the time of William the Conqueror to that of Henry VII., was derived from the weight of grains of wheat gathered from the middle of the ear, and well dried, 32 (changed in later times to 24) grains making a pennyweight, or the weight of a penny, 20 pennyweights an ounce, and 12 ounces a pound. Henry VII. introduced the troy pound. The avoirdupois pound was introduced during the reign of Henry VIII.

An acre was as much land as a yoke of oxen could plough in a day. A hyde was about 100 acres.

125. America, England, and France have endeavored to found their systems of weights and measures upon invariable or natural standards.

The standard units of linear, superficial, and solid measures of the United States are identical with those of Great Britain.

The weights and measures of some of the States differ from those of the United States. For the French system of weights and measures, see FRANCE, page 88.

STANDARD OF LENGTH.

126. The standard unit of length is the *yard*, and is determined as follows :

A pendulum vibrating *seconds* of mean time in the latitude of London, in a vacuum and at the level of the sea, is divided into 391,393 equal parts. 360,000 of these parts are equivalent to the length of the standard yard, or 36 inches.

#### STANDARD OF WEIGHT.

127. The standard unit of troy weight is the weight of 22.7944 cubic inches distilled water at its maximum density, or 22.8157 cubic inches at 62° Fahrenheit, barometer in both cases being at 30 inches. (See *HEAT*, page 291.)

The *avoirdupois* pound contains 7000 troy grains; the *troy* pound contains 5760 grains. The *avoirdupois* pound is equal to the weight of 27.7015 cubic inches of distilled water at its maximum density, or 27.7274 cubic inches at 62° Fahrenheit. A pint of water weighs about one pound.

The English Imperial weights and those of the United States are identical.

#### STANDARDS OF CAPACITY.

128. The United States standard unit of liquid measure is the old English wine gallon of 231 cubic inches, and contains 8.3389 pounds *avoirdupois*, or 10.134 pounds troy, of distilled water of 39.83° Fahrenheit, the barometer at 30 inches.

The Imperial standard gallon, for liquids and all dry substances, contains 10 pounds *avoirdupois* distilled water 62° Fahrenheit, barometer 30 inches, equal to 277.274 cubic inches.

The United States standard unit of dry measure is the British Winchester bushel, so called from the standard being kept at Winchester. It is a cylinder  $18\frac{1}{2}$  inches in diameter by 8 inches deep, and contains 2150.42 cubic inches, or 77.6274 pounds *avoirdupois*, of distilled water at its maximum density. A dry-measure gallon contains  $268\frac{2}{3}$  cubic inches.

#### UNITED STATES MONEY.

10 mills (*m.*) = 1 cent, *ct.*

10 cents = 1 dime, *d.*

10 dimes = 1 dollar, *¢*.

10 dollars = 1 eagle, *E.*

1 dollar = 10 dimes = 100 cents = 1000 mills.

The name *dollar* is from *dale* or *thal*, a dale or valley ; *dime*, from the French *disme*, one-tenth ; *cent*, from *centum*, one hundred ; and *mill*, from *mille*, a thousand.

129. The origin of the symbol \$, or the United States dollar mark, has been ascribed to several sources. By some it is supposed to represent the *U* written upon the *S*, denoting U. S. (United States). Some think it is a modification of the figure 8, having reference to 8 reals, or piece of Eight, as the dollar was formerly called ; others, that it represents the " Pillars of Hercules," which were stamped on the Pillar Dollar ; and others still, that it is a combination of the initials P. and S., from the Spanish *Peso Duro*, signifying Hard Dollar. As it is used in Portugal to note the thousands' place, it is probable that it originated in that country : a Mil-reis, or thousand reis, is written thus, 1\$000.

#### STATE CURRENCIES.

130. The money of this country before the adoption of the decimal currency by Congress in 1786 was in the denominations of pounds, shillings, and pence. The *Colonial notes* which were then in circulation had depreciated in value, and the number of shillings equivalent to a dollar at that time are given in the following table :

#### NEW ENGLAND CURRENCY.

|                                    |   |                           |
|------------------------------------|---|---------------------------|
| New England States, Virginia, Ken- | } | $\$1 = 6s. = 72d.$        |
| tucky, and Tennessee,              |   | $1s. = 16\frac{2}{3}cts.$ |

#### NEW YORK CURRENCY.

|                               |   |                           |
|-------------------------------|---|---------------------------|
| New York, Ohio, Michigan, and | } | $\$1 = 8s. = 96d.$        |
| North Carolina,               |   | $1s. = 12\frac{1}{2}cts.$ |

#### PENNSYLVANIA CURRENCY.

|                                 |   |                           |
|---------------------------------|---|---------------------------|
| Pennsylvania, New Jersey, Dela- | } | $\$1 = 7s. 6d. = 90d.$    |
| ware, and Maryland,             |   | $1s. = 13\frac{1}{3}cts.$ |

#### GEORGIA CURRENCY.

|                             |   |                           |
|-----------------------------|---|---------------------------|
| Georgia and South Carolina, | } | $\$1 = 4s. 8d. = 56d.$    |
|                             |   | $1s. = 21\frac{5}{7}cts.$ |

## TABLE

Showing the Weight and Fineness of the Coins of the United States, as given by Acts of Congress.

## GOLD.

| $\frac{11}{16}$ or .913 $\frac{1}{2}$ FINE. | Standard Weight. | Pure Gold.    | Com. Value. |
|---|------------------|---------------|-------------|
| Eagle coined before 1834,                   | 270. grains.     | 247.5 grains. | \$10.62     |
| $\frac{1}{2}$ " " " "                       | 135. "           | 123.75 "      | 5.31        |
| $\frac{1}{4}$ " " " "                       | 67.5 "           | 61.87 "       | 2.65        |
| .900 FINE.                                  |                  |               |             |
| Eagle coined since 1834,                    | 258. "           | 232.2 "       | 10.00       |
| $\frac{1}{2}$ " " " "                       | 129. "           | 116.1 "       | 5.00        |
| $\frac{1}{4}$ " " " "                       | 64.5 "           | 58.05 "       | 2.50        |
| 1 Dollar piece,                             | 25.8 "           | 23.22 "       | 1.00        |
| 1 Double Eagle,                             | 516. "           | 464.4 "       | 20.00       |
| 3 Dollar piece,                             | 7.74 "           | 69.66 "       | 3.00        |

## SILVER.

|  | Standard Weight. | Pure Silver.         |
|--|------------------|----------------------|
| Dollar before 1837, and shares in proportion, 892.4 fine,            | 416. grains.     | 371.25 grains.       |
| Dollar since 1837, .900 fine,  | 412.5 "          | 371.25 "             |
| $\frac{1}{2}$ " '37 to June, '53, .900 fine,                         | 206.25 "         | 185.625 "            |
| $\frac{1}{4}$ " " " " " "  | 103.125 "        | 92.8125 "            |
| Dime " " " " " "   | 41.25 "          | 37.125 "             |
| $\frac{1}{2}$ " " " " " "  | 20.625 "         | 18.5625 "            |
| 3 Cent piece, March, 1851, to March, 1853, $\frac{1}{2}$ fine, . . . | 12.375 "         | 10.8 "               |
| 20 Cent piece, March, 1875, to March, 1878,                          | 5 grams or       | $77\frac{16}{100}$ " |
| Trade dollar, 1872 to 1877,  | 420. grains.     |                      |
| $\frac{1}{2}$ Dollar since June, 1853,                               | 192. "           | 172.8 "              |
| (And smaller coins in proportion.)                                   |                  |                      |

Old Cent, 178 grains copper.

|                    |                                     |                                  |
|--------------------|-------------------------------------|----------------------------------|
| Cent of 1866,      | 48 grains.                          | 95% copper, 3% zinc, and 2% tin. |
| 2 " piece of 1866, | 96 "                                | 95 " 5% nickel.                  |
| 3 " " " "          | 32 "                                | 75 " 25% "                       |
| 5 " " " "          | 5 grams, or $77\frac{16}{100}$ grs. | 75% copper, 25% nickel.          |

Coining rate of 1 ounce gold bullion  $\frac{9}{10}$  fine, \$18.604.

" " " " silver " "  $1.16\frac{4}{11}$ .

## WEIGHTS AND MEASURES.

## LINEAR OR LONG MEASURE.

12 inches (in.) = 1 foot (ft.).

36 " = 3 " = 1 yard (yd.).

198 " =  $16\frac{1}{2}$  " =  $5\frac{1}{2}$  " = 1 rod (r.).

1920 " = 660 " = 220 " = 40 " = 1 furlong (F.).

63360 " = 5280 " = 1760 " = 320 " = 8 " = 1 mile (m.).

$69\frac{1}{2}$  miles (nearly) = 1 degree (deg. °); 360 degrees = circumference of the earth;  
6 feet = 1 fathom; 3.45 statute miles = 1 league; 1 knot or geographical mile =  $1\frac{1}{4}$   
statute miles; 4 inches = 1 hand; 9 inches = 1 span; 3 feet = 1 pace.

## SURFACE OR SQUARE MEASURE.

144 sq. inches = 1 sq. foot.

1296 " = 9 " = 1 sq. yard.

39204 " =  $272\frac{1}{4}$  " =  $80\frac{1}{4}$  " = 1 sq. rod.

1568160 " = 10890 " = 1210 " = 40 " = 1 sq. rod.

6272640 " = 43560 " = 4840 " = 160 " = 4 " = 1 acre.

4014489600 " = 27878400 " = 3097600 " = 102400 " 640 sq. a. = 1 sq. mile.

36 sections or square miles = 6 miles square = 1 township.

Carpenters' work is frequently computed by the square, containing 100 square feet;  
painters' by the square yard.

## SURVEYORS' MEASURE.

7.92 inches = 1 link (l.).

198 " = 25 " = 1 rod (rd.).

792 " = 100 " = 4 " or 66 ft. = 1 chain (ch.).

63360 " = 8000 " = 320 " = 80 " = 1 mile.

625 square links = 1 pole; 16 poles = 1 square chain; 10 square chains = 1 acre.

An acre is equal to  $208\frac{3}{4}$  feet square, nearly.

## CUBIC OR SOLID MEASURE.

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.).

27 " feet = 1 cubic yard (cu. yd.).

16 " " = 1 cord foot.

8 cord ft. or 128 cubic feet = 1 cord of wood.

A pile of wood 8 feet long, 4 wide, and 4 high = 1 cord.

$24\frac{3}{4}$  cubic feet, or  $16\frac{1}{2}$  feet long,  $1\frac{1}{2}$  feet high, and 1 foot wide = 1 perch.

Masons' work is frequently computed by the perch.

40 cubic feet of round timber, &c., as much round timber as will make 40 feet hewn  
= 1 ton or load. 50 cubic feet of hewn timber = 1 ton or load.

A register ton showing capacity of vessels = 100 cubic feet.

A cubic foot of distilled water, maximum density, weighs  $62\frac{1}{2}$  lbs. avoirdupois.

## LIQUID MEASURE.

## WINE MEASURE.

4 gills (g.) = 1 pint (pt.).

8 " = 2 " = 1 quart (qt.).

32 " = 8 " = 4 " = 1 gallon (gal.) (231 cubic inches).

2016 " = 504 " = 252 " = 63 " = 1 hogshead (hhd.).

In some States the barrel is estimated at  $81\frac{1}{2}$  gallons: in others, 32, 28, etc. The contents vary, and are usually determined by actual measurement. Casks, called tierces, pipes, butts, hogsheads, and tuns, are usually gauged, and do not express any definite measures. The following table is sometimes used:—42 gallons = 1 tierce; 2 tierces = 1 puncheon; 2 hogsheads = 1 pipe; 2 pipes = 1 tun.

## BEER MEASURE.

Used in measuring beer or milk, but becoming obsolete.

2 pints (pt.) = 1 quart (qt.).

8 " = 4 " = 1 gallon (gal.) = (282 cubic inches).

36 gallons = 1 barrel; 54 " = 1 hogshead.

## DRY MEASURE.

2 pints (pt.) = 1 quart (qt.).

16 " = 8 " = 1 peck (pk.).

64 " = 32 " = 4 " = 1 bushel (bus.) = 2150.42 cubic inches, or a cylinder  $18\frac{1}{2}$  inches deep and 8 inches in diameter. 36 bushels = 1 chaldron.

In a *heaped bushel* the cone is 6 inches above the brim of the measure. A heaped bushel contains 2747.70 cubic inches, or about five pecks, even measure. For weights of different grains, see table, page 293. 8 *struck* bushels = 1 English quarter.

## WEIGHTS.

## TROY OR MINT WEIGHT.

Used in weighing precious metals, jewelry, liquors, and in philosophical experiments.

24 grains (gr.) = 1 pennyweight (pwt.).

480 " = 20 " = 1 ounce (oz.).

5760 " = 240 " = 12 " = 1 pound (lb.).

## APOTHECARIES' WEIGHT.

Used in compounding medicines. In this weight the pound, ounce, and grain are the same as in troy weight. The ounce is differently divided.

20 grains (gr.) = 1 scruple (℥).

60 " = 3 " = 1 drachm (dr. or ʒ).

480 " = 24 " = 8 " = 1 ounce (℥).

5760 " = 288 " = 96 " = 12 " = 1 pound.

## MEDICAL DIVISION OF THE GALLON.

60 minims (℥) = 1 fluidrachm, f℥.

16 fluidounces = 1 pint, O.

8 fluidrachms = 1 fluidounce, f℥.

8 pints = 1 gallon, Cong.

O. is an abbreviation of *octarius*, the Latin for *one-eighth*; Cong. for *congius*, the Latin for gallon.

A single common teaspoonful, or 45 drops, makes about 1 fluidrachm. A common teacup holds about 4 fluidounces; a common tablespoon, about half a fluidounce; a pint of water weighs a pound.

R̄ is an abbreviation for *recipe*; or take; ℞, aa., for equal quantities; j. for 1; ij. for 2; ss. for *semi*, or half; gr. for grain; P. for *particula*, or little part; P. aa. for equal parts; q. p. as much as you please



## AVOIRDUPOIS OR COMMERCIAL WEIGHT.

Used in almost all commercial transactions.

16 drams = 1 ounce ( $437\frac{1}{2}$  grains).

256 " = 16 " = 1 pound (7000 grains).

6400 " = 400 " = 25 " = 1 quarter (short ton).

7168 " = 448 " = 28 " = 1 " (long ton).

25600 " = 1600 " = 100 " = 4 " = 1 hundredweight (short ton).

28672 " = 1792 " = 112 " = 4 " = 1 " (long ton).

51200 " = 32000 " = 2000 " = 80 " = 20 " = 1 short ton.

573440 " = 35840 " = 2240 " = 80 " = 20 " = 1 long ton.

The long ton is used at the U. S. Custom House, and in several kinds of business.

The standard avoirdupois lb. = weight of 27.7015 cubic inches distilled water at maximum density. 100 lbs. = 1 cental.

## TIME MEASURE.

60 seconds = 1 minute.

3600 " = 60 " = 1 hour.

86400 " = 1440 " = 24 " = 1 day.

2592000 " = 43200 " = 720 " = 30 " = 1 month.

31557600 " = 525960 " = 8766 " =  $365\frac{1}{4}$  " = 12 " = 1 year.

The time in which the earth revolves around the sun is 365 days, 6 hours, 9 minutes,  $9\frac{1}{2}$  seconds. The earth revolves at the rate of about 1040 miles an hour. February has 28 days, except in leap year, or years which may be divided by 4 without a remainder, when it has 29. Four months (April, June, September, and November) have each 30 days; all the others have each 31 days.

## CIRCULAR MEASURE.

60 seconds (") = 1 minute (').

3600 " = 60 minutes = 1 degree (°).

108000 " = 1800 " = 30 " = 1 sign (S.).

1296000 " = 21600 " = 360 " = 12 " = 1 circle (C.).

90° make a quadrant or right angle.

## PENDULUMS.

6 points = 1 line; 12 lines = 1 inch.

## SHOEMAKERS' MEASURE.

No. 1 small size is  $4\frac{1}{8}$  inches, and every succeeding No. increases  $\frac{1}{8}$  of an inch to 13.No. 1 large size is  $8\frac{1}{4}$  inches, and every succeeding No. increases  $\frac{1}{8}$  of an inch to 15.

## DIAMOND WEIGHT.

16 parts = 1 grain = 792 troy grains.

4 grains = 1 carat.

1 carat =  $8\frac{1}{4}$  grains troy, nearly.

## ASSAYERS' WEIGHT.

1 carat = 10 pwts. troy.

1 carat grain = 2 pwts. 12 grains or 60 grains troy.

24 carats = 1 lb troy.

The term carat is also used to express the fineness of gold, each carat meaning a twenty-fourth part. Thus 18 carats fine means  $\frac{3}{4}$  pure gold, and the remainder  $\frac{1}{4}$  alloy.

## MISCELLANEOUS TABLES.

## BOOKS AND PAPER.

| SIZE OF PAPER.     |          |                      |          |
|--------------------|----------|----------------------|----------|
|                    | Inches.  |                      | Inches.  |
| Demy .....         | 17 by 22 | Letter.....          | 10 by 15 |
| Medium.....        | 19 " 24  | Folio post.....      | 16 " 21  |
| Double medium..... | 24 " 38  | Foolscap.....        | 14 " 17  |
| Super-royal.....   | 21 " 27  | Crown.....           | 15 " 20  |
| Imperial.....      | 22 " 32  | Double Elephant..... | 26 " 40  |

A sheet (medium) folded in  
2 leaves is called folio.

|    |   |                    |
|----|---|--------------------|
| 4  | " | quarto or 4to.     |
| 8  | " | octavo or 8vo.     |
| 12 | " | duodecimo or 12mo. |
| 16 | " | 16mo.              |

|          |                            |
|----------|----------------------------|
| 12 units | = 1 dozen.                 |
| 144 "    | = 12 " = 1 gross.          |
| 12 gross | = 1 great gross.           |
| 20 units | = 1 score.                 |
| 56 lbs.  | = 1 firkin of butter.      |
| 84 "     | = 1 tub "                  |
| 100 "    | = 1 quintal of dried fish. |
| 196 "    | = 1 barrel of flour.       |
| 200 "    | = 1 " beef, pork, or fish. |

24 sheets = 1 quire.

480 " = 20 " = 1 ream.

2 reams = 1 bundle; 5 bundles = 1 bale.

280 lbs. = 1 barrel of salt.

100 " = 1 cask of raisins.

100 " = 1 keg of nails.

600 " = 1 barrel of rice.

14 " of iron or lead = 1 stone.

12 bbls of wheat = 7 English quarters.

21½ stone = 1 pig.

8 pigs = 1 fother.

For grain, see page 293.

## GREAT BRITAIN.

## MONEY.

|              |               |    |
|--------------|---------------|----|
| 4 Farthings  | = 1 Penny,    | d  |
| 12 Pence     | = 1 Shilling, | s. |
| 20 Shillings | = 1 Pound,    | £. |
| 1 Pound      | = \$4.8665    |    |

131. The Gold coins are the sovereign, which represents the pound, and the half-sovereign. The guinea, of 21 shillings, and its subdivisions, have not been coined since 1816. The standard for gold is 11 parts fine gold and 1 part alloy. The sovereign weighs  $123\frac{1}{3}$  grains, and contains  $113\frac{1}{3}$  or 113.001 grains pure gold.

The Silver coins are crowns of 5s., half-crowns, florins of 2s., shillings, the 6d., the 4d. or groats, and 3d. pieces. The shilling weighs  $87\frac{3}{4}$  and contains  $80\frac{3}{4}$  grains pure silver. The shilling of standard value is worth  $21\frac{7}{10}$  cents United States money.

The Copper coins are the penny, half-penny, and farthing, coined at the rate of 24 pence per pound avoirdupois.

132. Bank-of-England Notes are a legal tender for any sum over £5; silver is not a legal tender over 40s.; copper, for not more than 12d. in pennies or half-pennies; or 6d. in farthings.

133. £ is a contraction of *libræ*, s. of *solidi*, d. of *denarii*, and q. of *quadrantes*; farthing is another word for *fourthing*.

In accounts, a straight line (formerly the old style of s (*l*), an abbreviation of shilling), is written between shillings and pence when both are mentioned: thus 2/6 for 2s. 6d.

The word *sterling* is supposed to be derived from the first coiners of English silver, who came into England from Germany in the reign of Richard I., and were called *Easterlings*.

134. Intrinsic par value of £1 = \$4.8665, which is the U. S. Custom House value. Freight bills are paid at the rate of \$4.80 per £. In British America, £1 = \$4.

The English mint price of gold is £3 17s. 10½d. per ounce for standard gold, or ½ fine, equivalent to \$18.94 per ounce. The mint price of silver, subject to fluctuations, is 5s. per ounce for standard silver, or ¾ fine. A pound of silver, ¾ fine, is coined into 66 shillings = 5s. 6d. per ounce. For methods of calculation and money tables, see pages 170, 174, and 177.

## WEIGHTS AND MEASURES.

135. Before 1826, the chief of the measures of capacity agreeing with those of the United States, were the wine gallon of 231 cubic inches, the beer gallon of 282 cubic inches, and the Winchester bushel of 2150.42 cubic inches.

136. By act of Parliament, which came into operation January 1, 1826, certain weights and measures, under the name of Imperial weights and measures, were declared to be the only lawful ones in the United Kingdom.

137. By this act, the imperial gallon, both Liquid and Dry Measure, contains 277.274 cubic inches, or 10 lbs. avoirdupois

distilled water, the temperature  $32^{\circ}$ , barometer 30 inches. The imperial bushel contains 2218.192 cubic inches, or 8 imperial gallons; 8 bus. = 1 quarter; 10 qrs. = 1 last.

100 Imperial Bushels = 103.15 Winchester Bushels.

100 Winchester " = 96.94 Imperial "

5 Imperial Gallons nearly equal 6 Wine Gallons.

59 " " 60 Ale "

144 lbs. Avoirdupois = 175 lbs. Troy.

192 oz. " = 175 oz. "

138. The standard avoirdupois pound of the United States and the imperial pound avoirdupois are alike.

The Troy pound = 22.815689 cubic inches distilled water. The linear, superficial, and cubic measures are the same in England as in the United States. (*See Tables, page 92.*)

## CANADA CURRENCY.

The decimal currency came into use in 1859. The silver coins are the *fifty cent piece*, the *twenty-five cent piece*, the *twenty cent piece*, or shilling, the *dime*, and the *half dime*. These coins are  $\frac{3}{4}$  fine, and their value is about  $\frac{1}{2}$  that of United States coins of the same name. The copper coin is the cent. There are no Canadian gold coins; those of England and America are a legal tender.

The weights and measures correspond to those of England and the United States.

## FRANCE.

139. The Decimal or Metric System of moneys, weights, and measures is now established in France, and has been adopted, to a greater or less extent, in Belgium, Spain, Portugal, Holland, Switzerland, Sweden, Austria, Turkey, Brazil, and several other countries. The Congress of the United States, by act of July 27, 1866, made it lawful in contracts and in legal proceedings, and Great Britain, in 1864, passed an act authorizing its use. The terms of the metric system are now generally adopted by scientific men.

140. MM. Delambre and Mechain estimated the length of

the meridian from the equator to the pole by the measurement of an arc between Dunkirk and Barcelona, and the *ten-millionth* part of this meridian, or one-fourth of the circumference of the earth, was taken as the unit of *length*, and is termed a **Metre**.

141. The square of 10 metres is the *unit of surface measure*, and is called an **Are** (pronounced *air*).

142. The cube of the *tenth part of a metre* is the *unit of capacity* for either Liquid or Dry measure, and is called a **Litre** (pronounced *le'-tur*).

143. A **kil'olitre**, the cube of a metre, is the *unit of Cubic or Solid Measure*, and is known as the **Stere**.

144. A **Gramme**, the unit of weight, is the weight of a quantity of water at 32° Fahr. (the temperature of melting ice), contained in a cube of the *one-hundredth part of a metre*.

145. The names of the *multiples* of these integers are derived from the Greek, and those of the *divisions* from the Latin language.

|              |                  |                  |                  |                    |
|--------------|------------------|------------------|------------------|--------------------|
| <i>Deca</i>  | <i>signifies</i> | <i>10 times.</i> | <i>Deci, the</i> | <i>10 th part.</i> |
| <i>Hecto</i> | "                | <i>100 "</i>     | <i>Centi, "</i>  | <i>100 th "</i>    |
| <i>Kilo</i>  | "                | <i>1000 "</i>    | <i>Mille, "</i>  | <i>1000 th "</i>   |
| <i>Myria</i> | "                | <i>10000 "</i>   |                  |                    |

### MONEY.

*10 Centimes = 1 Decima.*

*10 Decimes, or 100 Centimes = 1 Franc.*

146. The French coin is based upon the unit of weight,—the *gramme*.

147. Silver is the legal standard of value in France. The franc in silver is valued at 9.384 pence sterling. The value of the franc in gold is 9.516 pence sterling, giving fr. 25.22 for £1 sterling. The United States Custom-House valuation of the franc is 19.3 cents.

148. The mint standard for both gold and silver is  $\frac{9}{10}$  pure and  $\frac{1}{10}$  alloy. The gold coins are the *napoleon*, of 20 francs, and the 100, 50, 10, and 5 franc pieces.

A kilogramme of standard gold is coined into 155 twenty-franc pieces.

The silver coins are the silver napoleon, of 5 francs, and the 2, 1,  $\frac{1}{2}$ , and  $\frac{1}{4}$  franc pieces. 1 sou (an old term) = 5 centimes.

The copper or bronze pieces are 10, 5, 2, and 1 centimes, weighing, respectively, 10, 5, 2, and 1 grammes.

149. Accounts were formerly kept in livres tournoise, with its subdivisions of the sou and denier. 12 deniers = 1 sou or sol, 20 sous = 1 livre tournoise, 24 livres = 1 louis-d'or, 3 livres = 1 ecu or crown, 81 livres = 80 francs.

### WEIGHTS.

*Gramme* = 15.432349 grains Troy.

150. The kilogramme (1000 grammes) is the weight most frequently used in commerce, and is equal to 2.679227 lbs. (2 lbs. 8 oz. 3 dwt.) Troy; or, 2.204621 lbs. (2 lbs. 3 oz. 4.652 dr.) avoirdupois. A kilogramme is generally taken as  $2\frac{1}{2}$  lbs.

$373\frac{1}{4}$  grammes = 1 lb. Troy.     $453\frac{3}{5}$  grammes = 1 lb. avoirdupois.

1 cwt. = 50.80234 kilogrammes.

100 myriogrammes = 1 ton,  $20\frac{1}{6}$  lbs.

1 quintal métrique = 100 kilogrammes.

**Note.**—At the U. S. Post-Office, 15 grammes are taken as  $\frac{1}{2}$  ounce.

### MEASURES.

#### Measures of Length.

1 metre = 39.371 English inches.

1 decimetre = 3.9371 " "

1 kilometre = 0.62138 miles.

1 Eng. mile = 1.609036 kilometres.

**Old Measure.**—1 aune =  $1\frac{1}{2}$  yds. 1 brace =  $\frac{2}{3}$  yds. See Art. 73. Merchants usually reckon the metre as one and one-twelfth yards.

#### Measures of Surface.

1 are = a square decimetre = 119.6046 sq. yards.

1 centiare = 10.76441 sq. ft.

1 " = 1.196046 sq. yds.

1 hectare = 2.471114 acres, or 2 acres, 1 rood, 35 perches.

1 acre, Eng. = .40466 hectares.

100 sq. ft. = 9.28987 sq. metres.

## Measures of Capacity.

|              |  |
|--------------|--|
| 1 litre      | = 61.02803 cubic inches.   |
| 1 "          | = 2.1135 wine pints, or 1.7608 imperial pints, or 908 qts. dry measure.                    |
| 1 hectolitre | = 3.53171 cubic ft. = 22.01 imperial gals., or 26.419 wine gals., or 2.839 Winchester bus. |

## Measures of Solidity.

|                      |                                     |
|----------------------|-------------------------------------|
| 1 stere or kilolitre | = 35.31714 cubic feet = .2759 cord. |
| 1 "                  | = 1.308042 " yds.                   |
| 100 cubic inches     | = 16.38592 " centimetres.           |
| 1 inch               | = 2.54 centimetres.                 |
| 1 yard               | = .9144 metres.                     |
| 1 square yard        | = .8361 square metres.              |
| 1 cubic inch         | = 16.39 cubic centimetres.          |
| 1 cubic foot         | = 28.320 " "                        |
| 1 gallon             | = 3.786 litres.                     |
| 1 bushel             | = .3524 hectolitres.                |
| 1 Troy pound         | = .373 kilogrammes.                 |
| 1 avoird " "         | = .4536 " "                         |

## GERMANY.

## MONEY.

1 mark = 100 pfennige = 23.82 cents.

The Reichsmark (Royal mark) became the general coin in January, 1875. The pfennige, or pennies, are each worth one-fourth of one cent. The gold coins are the five-mark piece, called Halbe Krone (half crown), the ten-mark piece, called Krone (crown), and the twenty-mark piece, called Doppel Krone (double crown). (See also pages 90 and 179.)

## WEIGHTS AND MEASURES.

The metric system of weights and measures came into force in Germany January 1, 1872.

|                      |                    |                                   |                             |
|----------------------|--------------------|-----------------------------------|-----------------------------|
| Gramme               | = 15.434 gr. Troy. | Litre (Mass),                     | 1.76 imperial pint.         |
| Kilogramme           | = 2.205 " avoird.  | Metre (Stab),                     | 3.28 ft. or 39.37 in.       |
| Centner of 50 Kilo   | = 110 lbs. "       | Kilometre,                        | 1903 yds., or nearly 5 fur. |
| Quintal of 2 Centner | = 220 " "          | Quadrat, or Sq. Kilometre,        | 247 acres,                  |
| Tonne of 20 Centner  | = 2200 lbs. "      | or 2 $\frac{3}{5}$ sq. kilometres | to 1 sq. mile.              |

## VALUE OF FOREIGN COINS.

| COUNTRY.                       | MONEY UNIT.              | STANDARD.           | VALUE IN U. S. MONEY. | STANDARD COIN.                                 |
|--------------------------------|--------------------------|---------------------|-----------------------|--|
| Austria.....                   | Florin.....              | Silver.....         | .40.7                 |  |
| Belgium.....                   | Franc.....               | Gold and silver.... | 19.3                  | 5, 10, and 20 francs.                          |
| Bolivia.....                   | Boliviano.....           | Silver.....         | .82.3                 | Boliviano.                                     |
| Brazil.....                    | Milreis of 1000 reis.... | Gold.....           | .54.6                 |  |
| British Possessions in N. A.   | Dollar.....              | Gold.....           | \$1.00                |  |
| Chili.....                     | Peso.....                | Gold and silver.... | 91.2                  | Condor, doubloon, and escudo.                  |
| Cuba.....                      | Peso.....                | Gold and silver.... | .89.2                 | 10 and 1 doubloon.                             |
| Denmark.....                   | Crown.....               | Gold.....           | .26.8                 | 10 and 20 crowns.                              |
| Ecuador.....                   | Peso.....                | Silver.....         | .82.3                 | Peso.  |
| Egypt.....                     | Piaster.....             | Gold.....           | .04.9                 | 5, 10, 25, 50, and 100 piasters.               |
| France.....                    | Franc.....               | Gold and silver.... | 19.3                  | 5, 10, and 20 francs.                          |
| Great Britain.....             | Pound sterling.....      | Gold.....           | 4.86.6 1/4            | 1/2 sovereign and sovereign.                   |
| Greece.....                    | Drachma.....             | Gold and silver.... | .19.3                 | 5, 10, 20, 50, and 100 drachmas.               |
| German Empire.....             | Mark.....                | Gold.....           | .23.8                 | 5, 10, and 20 marks.                           |
| India.....                     | Rupee of 16 annas....    | Silver.....         | .39                   |  |
| Italy.....                     | Lira.....                | Gold and silver.... | 19.3                  | 5, 10, 20, 50, and 100 lire.                   |
| Japan.....                     | Yen.....                 | Silver.....         | .88.8                 | 1, 2, 5, 10, and 20 yen, gold, and silver yen. |
| Liberia.....                   | Dollar.....              | Gold.....           | 1.00                  |  |
| Mexico.....                    | Dollar.....              | Silver.....         | .89.4                 |  |
| Netherlands.....               | Florin.....              | Gold and silver.... | .40.2                 | Peso or dollar, 5, 10, 25, and 50 centavo.     |
| Norway.....                    | Crown.....               | Gold.....           | .26.8                 | 10 and 20 crowns.                              |
| Peru.....                      | Sol.....                 | Silver.....         | .82.3                 |  |
| Portugal.....                  | Milreis of 1000 reis.... | Gold.....           | 1.08                  | 2, 5, and 10 milreis.                          |
| Russia.....                    | Rouble of 100 copecks    | Silver.....         | .65.8                 | 1/2, 1, and 1 rouble.                          |
| Sandwich Islands.....          | Dollar.....              | Gold.....           | 1.00                  |  |
| Spain.....                     | Peseta of 100 centimes   | Gold and silver.... | 19.3                  | 5, 10, 20, 50, and 100 pesetas.                |
| Sweden.....                    | Crown.....               | Gold.....           | .26.8                 | 10 and 20 crowns.                              |
| Switzerland.....               | Franc.....               | Gold and silver.... | 19.3                  | 5, 10, and 20 francs.                          |
| Tripoli.....                   | Mahbub of 20 piasters    | Silver.....         | .74.3                 |  |
| Turkey.....                    | Piaster.....             | Gold.....           | .04.4                 | 25, 50, 100, 250, and 500 piasters.            |
| United States of Colombia..... | Peso.....                | Silver.....         | .82.3                 | Peso.  |
| Venezuela.....                 | Bolivar.....             | Gold and silver.... | 19.3                  | 5, 10, 20, 50, and 100 Bolivar.                |

The foregoing estimation, made by the Director of the Mint, of the value of the foreign coins above mentioned, I hereby proclaim to be the values of such coins expressed in the money of account of the United States, and to be taken in estimating the values of all foreign merchandise, made out in any of said currencies, imported on or after January 1, 1881.

JOHN SHERMAN, Secretary of the Treasury.

TREASURY DEPARTMENT, WASHINGTON, D. C., January 1, 1881.



## SYNOPSIS OF FOREIGN MONEYS OF ACCOUNT.

| Money at   |             | Dolls. Cts. |
|--|-------------|-------------|
| Amsterdam, 5 cents = 1 stiver, 20 stivers = 1<br>guilder or florin .....                   | 1 florin    | = .40,2     |
| Berlin, 30 silver groschen = 1 thaler .....  | 1 thaler    | = .69       |
| Bremen, 5 schwaren = 1 grote, 72 grotes = 1<br>rix-daler, 5 rix-dalers = 1 louis d'or..... | 1 s. daler  | = .79½      |
| Calcutta, 12 pies = 1 anna, 16 annas = 1 rupee..   | 1 rupee     | = .44½      |
| Christiania, 120 skilling = 1 specie-daler.....  | 1 s. daler  | = 1.06      |
| 1 banco rix-dollar = .39½.   |             |             |
| Constantinople, 40 paras = 1 piastre, 100 piastres<br>= 1 medjidie.....                    | 1 medjidie  | = 3.35      |
| Copenhagen, 96 skilling = 1 rigsbank daler .....   | 1 s. daler  | = 1.05      |
| 1 banco rix-dollar = .55.  |             |             |
| Frankfort, 60 kreutzer = 1 Zollverein florin or<br>guilder .....                           | 1 florin    | = .40       |
| Genoa, 100 centesimi = 1 lira Italiana .....   | 1 lira      | = .19,½     |
| Hamburg, 12 pfenning = 1 schilling, 16 schil-<br>ling = 1 mark .....                       | 1 m. banco  | = .35½      |
| Lisbon, 1000 reis = 1 milreis.....   | 1 milreis   | = 1.12      |
| London, 240 pence = 20 shillings = 1 pound .....   | 1 pound     | = 4.8665    |
| Madrid, 34 maravedis = 1 real, 20 reals = 1 duro.  | 1 duro      | = 1.00      |
| Naples, 10 grani = 1 carlino, 10 carlini = 1 ducat.  | 1 ducat     | = .80       |
| New York, 100 cents = 1 dollar .....   |             | = 1.00      |
| Palermo, 20 grani = 1 taro, 30 tari = 1 onza .....   | 1 onza      | = 2.40      |
| Paris, 100 centimes = 1 franc. ....  | 1 franc     | = .19,½     |
| Pekin, 1 tael = 10 mace = 100 candareens =<br>1000 cash.....                               | 1 tael      | = 1.48      |
| Rio de Janeiro, 1000 reis = 1 milreis .....  | 1 milreis   | = .83½      |
| Rome, 10 bajocchi = 1 paolo, 10 paoli = 1 scudo<br>Romano .....                            | 1 s. Romano | = .99½      |
| St. Petersburg, 100 copeck = 1 silver rouble.....  | 1 s. rouble | = .75       |
| Stockholm, 12 runstyken = 1 skilling, 48 skil-<br>lingar = 1 daler in banco.....           | 1 daler     | = 1.06      |
| Venice, 100 centesimi = 1 lira Austriaca, 3 lire<br>Austriache = 1 florin Austriaco .....  | 1 lira      | = .16       |
| Vienna, 100 kreutzer = 1 gulden or florin.....   | 1 florin    | = .40,7     |

Several countries have recently adopted the metric system, the names of the denominations being different in the different countries.

## COMPARATIVE TABLES OF WEIGHTS AND MEASURES.

|   |                          |                      |                            |
|---|--------------------------|----------------------|----------------------------|
| 1 Imperial Gallon = 277.274 cubic inches = 1.2 Wine Gallons.            |                          |                      |                            |
| Wine Measure, 1 quart   | = 57½                    | "                    | 1 gal. = 231 cubic inches. |
| Dry " 1 "   | = 67½                    | "                    | 1 " = 268 "                |
| Beer " 1 "  | = 70½                    | "                    | 1 " = 282 "                |
| Troy Weight,  | } 1 pound = 5760 grains. | 1 ounce = 480 grains |                            |
| Apothecaries' Weight,   |                          |                      |                            |
| Avoirdupois " 1 "   | = 7000                   | " 1 "                | = 437½ "                   |
| 175 lbs. Troy = 144 lbs. Avoirdupois.                                   |                          |                      |                            |
| 195 oz. " = 192 oz. "   |                          |                      |                            |
| Dry Measure, 1 Bushel of U. S. (Winchester bu.) = 2150.42 cubic inches. |                          |                      |                            |
| " 1 Imperial Bushel of Great Britain                                    | = 2218.192               | "                    |                            |
| " 1 Bushel U. S. heaped measure   | = 2747.7167              | "                    |                            |

## FOREIGN WEIGHTS AND MEASURES

## FREQUENTLY MET WITH IN REPORTS OF MARKETS.

|                                   |                  |
|-----------------------------------|------------------|
| Ahm, in Rotterdam (nearly)        | 40 gallons.      |
| Almude, in Portugal               | 4.37 "           |
| Almude, in Madeira                | 4 to 8 gallons.  |
| Alquiere, "                       | 1½ to 2 pecks.   |
| " in Bahia                        | 1 bushel.        |
| " in Maranham                     | 1½ bushels.      |
| " in Rio Janeiro                  | 1 to 1½ bushels. |
| " in Pernambuco                   | 1 to 1½ "        |
| Anna of rice, in Ceylon           | 260.4 pounds.    |
| Arroba, in Portugal               | 32 "             |
| " in Spain                        | 25 "             |
| " of wine, in Spain (large)       | 4.246 gallons.   |
| " " " (small)                     | 3.34 "           |
| " in Malaga                       | 4½ "             |
| Arsheen, in Russia                | 28 inches.       |
| Bahar, in Batavia (large)         | 4½ piculs.       |
| " " (small)                       | 3 "              |
| Bale of cinnamon, in Ceylon (net) | 104½ pounds.     |
| Barilla, in Naples                | 11 gallons.      |
| Cantar, in the Levant             | 118.8 pounds.    |
| " of oil, in Leghorn              | 88 "             |
| " of brandy "                     | 120 "            |
| " in Malta                        | 174½ "           |

|   |                          |
|---|--------------------------|
| Cantar (grosso) in Naples .....             | 196½ pounds.             |
| “ (piccolo) “ .....                         | 106 “                    |
| “ (grosso) in Sicily .....                  | 192½ “                   |
| “ (sottile) “ .....                         | 175 “                    |
| Carro, in Naples .....                      | 52.2 bushels.            |
| “ of wine, in Naples .....                  | 264 gallons.             |
| Catta of tea, in China .....                | 1½ pounds.               |
| Cayang of rice, in Batavia .....            | 3581 “                   |
| Chih, of China .....                        | 14½ inches.              |
| Chetwert, in Russia .....                   | 5.95 bushels.            |
| Fanega, in Spain .....                      | 1.6 “                    |
| Hectolitre, in France .....                 | 2.84 bus. or 26.42 gals. |
| Kilogramme, in France and Netherlands ..... | 2½ pounds.               |
| Last of grain, in Amsterdam .....           | 85½ “                    |
| “ “ in Bremen .....                         | 80½ “                    |
| “ of salt, in Cadiz .....                   | 75½ bushels.             |
| “ or moyo of salt, in Portugal .....        | 70 “                     |
| “ of grain, in Dantzic (nearly) .....       | 93 “                     |
| “ “ in Hamburg .....                        | 89.7 “                   |
| “ “ in Lubeck .....                         | 91 “                     |
| “ “ in Rotterdam .....                      | 85½ “                    |
| “ in Sweden .....                           | 75 “                     |
| “ Utrecht .....                             | 59+ “                    |
| Lispound, in Hamburg .....                  | 14 pounds.               |
| Maund (factory), in Calcutta .....          | 74½ pounds.              |
| “ (bazaar), 10 % heavier .....              | 82.4 “                   |
| Mina of grain, in Genoa .....               | 3.43 bushels.            |
| Moyo, of Lisbon .....                       | 23+ “                    |
| “ in Oporto .....                           | 30 “                     |
| Oke, in Smyrna .....                        | 2.83 pounds.             |
| Orna (or eimer) of wine, in Trieste .....   | 14.94 gallons.           |
| “ of oil .....                              | 17 “                     |
| Palmo, in Naples .....                      | 10½ inches.              |
| Picul, in Batavia and Madras .....          | 136 pounds.              |
| “ in China and Japan .....                  | 133½ “                   |
| Pipe of wine, in Spain .....                | 160+ gallons.            |
| Pood, in Russia .....                       | 36 lbs. 1. oz. 10 drs.   |
| Quintal, in Portugal .....                  | 89.05 pounds.            |
| “ in Smyrna .....                           | 127.2 “                  |
| “ (of 4 arrobas), in Spain .....            | 100 “                    |
| “ in Turkey .....                           | 124½ “                   |
| “ of cotton (45 okes), in Turkey .....      | 127.3 “                  |

## 94 REDUCTION OF DENOMINATE NUMBERS.

|                                    |                  |
|------------------------------------|------------------|
| Rottolo, in Portugal .....         | 12½ pounds.      |
| “ in Genoa.....                    | 24 “             |
| “ in Leghorn .....                 | 3 “              |
| Salma of grain, in Sicily.....     | 9.77 bushels.    |
| “ (general) “ .....                | 7.85 “           |
| “ of wine “ .....                  | 23.06 gallons.   |
| Scheffel, in Germany.....          | 1½ to 3 bushels. |
| Ship pound, in Denmark.....        | 352 pounds.      |
| “ “ in Hamburg.....                | 299½ “           |
| Staro (or stajo), in Trieste ..... | 2.34+ bushels.   |
| Tale, in China .....               | 1½ ounces.       |
| Vara, in Rio Janeiro.....          | 1¼ yards.        |
| “ in Spain.....                    | 9½ “             |

## REDUCTION OF DENOMINATE NUMBERS.

151. A **denominate number** is one of a given name or denomination, as 3 yards, 10 dollars, 6 pounds, etc.

152. A **compound denominate number** is a combination of two or more denominate numbers.

153. A **denominate fraction** is one or more of the parts of a denominate number.

154. **Reduction of denominate numbers** is the process of changing them from one denomination to another without changing their value. It is of two kinds,—reduction ascending and reduction descending.

### REDUCTION DESCENDING.

155. **Reduction descending** is the process of changing a denominate number to one of a lower denomination, as gallons to pints, etc.

*Rule.*—1. *Multiply the number of the highest denomination by the number which one of this denomination makes of the next lower.*

2. *Add to the product the number in the next lower denomination, if any.*

3. *Proceed in the same manner through the lower denominations to the one required.*

EXAMPLES.

1. How many pints in 3 bushels, 1 peck, and 1 pint ?

*3 bus., 1 pk., 0 qt., 1 pt.*

*4 pecks = 1 bushel.*

12

*1 added.*

13 pecks.

*8 quarts = 1 peck.*

104 quarts.

*2 pints = 1 quart.*

208

1

*Ans. 209 pints.*

2. Reduce 6 yards 2 feet 8 inches to inches.

Reduce

3. 12 gallons to pints.

4. 2 tons, long measure, to lbs.

5. 10 sq. yds. 2 sq. ft. to sq. in.

6. 14 days 3 hours to seconds.

7. 8 acres 20 perches to sq. ft.

8. 7 miles 20 rods to feet.

9. 3 lbs. 3 oz. Troy to grains.

10. 3 lbs. 3 oz. avoird. to grs.

11. 8 bus. 3 pks. 5 qts. 1 pint  
to pints.

12. How many cubic inches in 184 cubic yards ?

13. How many pints in 22 bushels, 6 quarts, 1 pint ?

14. How many inches in 6 rods, 2 yards, 8 feet, 6 inches ?

15. How many minutes in one day ?

16. How many pounds in 1 ton, 3 cwt., 3 qrs., 10 lbs. ?

17. Reduce 75 bushels to pints.

18. What will be the profit on 3 bushels of chestnuts bought at \$1.50 per bushel, and sold at 5 cents per pint ?

19. How many half-pint bottles can be filled with 14 gallons of wine ?

20. If 8 feet of rope weigh a pound, how much will a rope 3 miles and 25 rods long weigh ?

21. What is the value of 145 pounds, 7 ounces silver, at 6½ cents per pennyweight ?

22. What will 3½ acres of land cost at 50 cents per square foot ?

23. How many inches in a rope 30 yards 1 foot long ?

## REDUCTION ASCENDING.

**156. Reduction ascending** is the process of changing a denominate number to one of a higher denomination, as inches to yards, ounces to pounds, etc.

**Rule.**—1. Divide the given number by the number required to make one of the next higher denomination.

2. Divide the quotient thus obtained as before, and so proceed to the denomination required. The last quotient with the several remainders will be the answer.

**Note.**—The remainders, if any, are of the same denomination as the numbers divided.

## EXAMPLES.

1. How many gallons in 171 gills, wine measure ?

$$\begin{array}{ll} 4 \text{ gills} = 1 \text{ pint.} & 4) 171 \text{ gills.} \\ 2 \text{ pints} = 1 \text{ quart.} & \underline{2) 42} \text{ pints and 3 gills.} \\ 4 \text{ quarts} = 1 \text{ gallon.} & \underline{4) 21} \text{ quarts.} \end{array}$$

5 gallons and 1 quart.

*Ans.* 5 gallons, 1 quart, 0 pints, 3 gills.

2. Reduce 64960 pounds Avoirdupois to short tons.

Change—

- |  |   |
|--|---|
| 3. 27150 pounds to long tons.            | 8. 278648 cubic inches to cubic yards.            |
| 4. 892 inches to yards.                  | 9. 38764 pints to bushels.                        |
| 5. 1492 pints to gallons.                | 10. 274316 square feet to acres.                  |
| 6. 184620 seconds to days.               | 11. 1445 grains, apothecaries' weight, to ounces. |
| 7. 2847 pints, wine measure, to gallons. |   |

12. What will 26840 pounds of iron cost at \$35 per ton ?

13. In 7846 grains of gold how many pounds ?

14. How many pounds of gold can be bought for \$187.20 at \$20.50 per ounce ?

15. How many miles will a man travel in a day at the rate of 5 feet in a second ?

16. What will be the difference between the cost of 30 long tons of coal at \$6 per ton, and the same quantity at the same price per short ton ?

## REDUCTION OF DENOMINATE FRACTIONS.

157. To reduce a denominate fraction or decimal to integers of lower denominations.

*Rule.*—Multiply the fraction or decimal (see Arts. 73 and 86) by the number required to reduce a whole number of the same denomination to the next lower denomination, and if the result be an improper fraction, reduce it to a whole or mixed number.

If there is a fractional part, proceed with it as before, and so continue to the lowest denomination required.

In multiplying decimals, point off as in multiplication of decimals.

*Note.*—Only the decimal part of each number should be multiplied.

## EXAMPLES.

1. Reduce  $\frac{7}{8}$  of a gallon to integers of lower denominations.

$\frac{7}{8}$   
Denom.  $\frac{4}{8}$  qts. in a gallon.

$8) 28$  (3 qts.

$\frac{24}{4}$

$\frac{4}{8}$

$\frac{2}{8}$  pints in a qt.

$8) 8$  (1 pint.

$\frac{8}{8}$

Ans. 3 quarts, 1 pint.

$\frac{7}{8} = .875$

$\frac{4}{8}$  qts. in a gallon.

$3.500$  quarts.

$\frac{2}{8}$  pints in a quart.

$1.000$  pint.

Ans. 3 quarts, 1 pint.

2. Reduce  $\frac{7}{8}$  of a yard to integers of lower denominations.

What is the value of—

- |   |                             |
|---|-----------------------------|
| 3. $\frac{4}{5}$ of a mile?             | 11. .375 of a pound Avoir.? |
| 4. $\frac{5}{8}$ of a bushel?           | 12. .1875 of a square yard? |
| 5. $\frac{3}{8}$ of a pound Troy?       | 13. .19 of a week?          |
| 6. $\frac{5}{16}$ of a pound Avoir.?    | 14. .625 of a long ton?     |
| 7. $\frac{19}{100}$ of a week?          | 15. .0625 of 3 yards?       |
| 8. $\frac{3}{8}$ of a bushel?           | 16. 1.875 of a bushel?      |
| 9. $\frac{3}{8}$ of a gal., wine meas.? | 17. .425 of a pound Troy?   |
| 10. .625 of a pound Troy?               | 18. 2.19375 of a year?      |

## 98 REDUCTION OF DENOMINATE FRACTIONS.

**158. To change a fraction or decimal of one denomination to a higher or lower denomination.**

*Rule.*—If the fraction is to be changed to a lower denomination multiply it, and if to a higher divide it, by the same numbers that are required in the reduction of whole numbers.

### EXAMPLES.

1. Reduce  $\frac{1}{40}$  of a yard to the fraction of an inch.

By fractions :

$$\frac{1}{40} \times 3 = \frac{3}{40} \text{ feet}, \frac{3}{40} \times 12 = \frac{36}{40} = \frac{9}{10} \text{ inches, Ans.}$$

By decimals :

$$\frac{1}{40} = .025. \quad .025 \times 3 \times 12 = .9, \text{ same as above.}$$

2. Change  $\frac{9}{10}$  of an inch to the fraction of a yard.

By fractions :

$$\frac{9}{10} \div 12 = \frac{9}{120}. \quad \frac{9}{120} \div 3 = \frac{3}{120} = \frac{1}{40} \text{ Ans.}$$

By decimals :

$$9 \div 12 = .075. \quad .075 \div 3 = .025 = \frac{1}{40}.$$

What part of

3. An inch is  $\frac{5}{8}$  of a yard? | 9. A pint is .125 of a quart?

4. An oz. is  $\frac{8}{120}$  of a lb. Avoir? | 10. A foot is .375 of a yard?

5. A sec. is  $\frac{7}{1200}$  of a day? | 11. A pint is .1245 of a gal.?

6. A gallon is  $\frac{3}{4}$  of a pint? | 12. A bushel is .625 of a pint?

7. A yard is  $\frac{1}{2}$  of an inch? | 13. A lb. Troy is .75 of a grain?

8. A bushel is  $\frac{2}{3}$  of a pint? | 14. A mile is .425 of a foot?

**159. To change one denominate number to the common fraction of another.**

*Rule.*—Change both numbers to the lowest denomination contained in either. Write the given number so reduced as the numerator. Write the number of which the part is required as the denominator, then change the resulting fraction to its lowest terms.



160. To change a denominate number to the decimal of a higher.

*Rule.*—Annex one or more ciphers to the lowest denomination, divide by that number which will change it to the next higher denomination, and annex the quotient as a decimal to the next higher denomination, then divide that higher denomination as before, and so continue till the required decimal is obtained.

Or, Change the given number to a common fraction of the denomination required, and change this fraction to a decimal.

*Note.*—For an abbreviated method of reducing shillings and pence to decimals of a pound sterling, see page 103.

## EXAMPLES.

1. What part of a gallon is 3 quarts 1 pint?

TO A COMMON FRACTION.

$$\begin{aligned} 3 \text{ quarts, } 1 \text{ pint} &= 7 \text{ pints.} \\ 1 \text{ gallon} &= 8 \text{ pints.} \quad \text{Ans. } \frac{7}{8} \\ \frac{7}{8} &= .875. \end{aligned}$$

TO A DECIMAL.

$$\begin{aligned} 2) \underline{1.0 \text{ pints.}} \\ 4) \underline{3.5 \text{ quarts.}} \\ 0.875 \text{ gallons.} \\ .875 &= \frac{7}{8}. \end{aligned}$$

2. Reduce £7 15s. 6d. 3 far. to the decimal of a pound.

$$\begin{array}{r|l} 4 & 3.00 \\ \hline 12 & 6.7500 \\ 20 & 15.5625 \\ \hline \end{array} \quad \begin{aligned} 3 \text{ far.} &= .75 \text{ of a penny.} \\ 6.75 \text{ d.} &= .5625 \text{ of a shilling.} \\ \text{£7.778125 } 15.56250 \text{ s.} &= .778125 \text{ of a £.} \\ \text{Ans. } \text{£7.778125.} \end{aligned}$$

3. Reduce £617 1s. 1d. to the decimal of a pound.

$$\begin{array}{r|l} 12 & 1.0000 \\ 20 & 1.0833 \\ \hline \end{array} \quad \text{£617.05416 Ans.}$$

4. Reduce 3 bus. 1 pk. 3 qts. to the decimal of a bushel.  
 5. Reduce 3 qrs. 12 lbs. 8 oz. to the decimal of a ton.  
 6. Reduce 2 gals. 1 qt. 1 pt. to the decimal of a gallon.

Find the answers of the following in decimals and in common fractions.

7. What part of 1 acre is 140 rods? *Ans.*  $\frac{7}{8}$ , .875.

8. What part of 8 lbs. Troy is 1 lb. 5 oz.? *Ans.*  $\frac{1}{8}$ , .125.

What part of

- |  |  |
|--|--|
| 9. A cubic yd. is 84 cub. in.?             | 12. A bushel is 1 peck 1 pint?             |
| 10. 1 pound Troy is 17 grains?             | 13. 2 rods 3 feet is 1 yard 2 feet 1 inch? |
| 11. 2 weeks 6 hours is 3 hours 40 seconds? | 14. 4 yds. 6 in. is 11 ft. 9 in.?          |

### ALIQOT PARTS.

**161.** An aliquot part of a number or quantity is an exact divisor of that number or quantity. Thus, 5 is an aliquot part of 20;  $33\frac{1}{3}$  is an aliquot part of 100.

Many business computations may be abbreviated by combining the values of convenient aliquot parts.

#### EXAMPLES.

1. What will 288 yards of cloth cost at \$1.87<sup>2</sup> cents per yd.?

At \$1.00 the price would be \$288

" .50  $\frac{1}{2}$  of 100 " " " " 144

" .25  $\frac{1}{2}$  of 50 " " " " 72

" .12<sup>5</sup>  $\frac{1}{2}$  of 25 " " " " 36

1.87<sup>2</sup>

\$540

2. What will 7 bus. 3 pks. 6 qts. cost at \$1.60 per bushel?

7 bushels @ \$1.60 = \$11.20

2 pecks =  $\frac{1}{2}$  bushel = .80

1 peck =  $\frac{1}{4}$  bushel = .40

4 quarts =  $\frac{1}{2}$  peck = .20

2 quarts =  $\frac{1}{2}$  of  $\frac{1}{2}$  peck = .10

7 bushels 3 pecks 6 quarts = \$12.70

3. If a man's wages are at the rate of \$48 for 30 days, how much should he receive for 54 days?

$$\begin{array}{rcl}
 30 \text{ days' wages} & = & \$48. \\
 15 \text{ " " } & = & \frac{1}{2} \text{ of } 30 = 24. \\
 6 \text{ " " } & = & \frac{1}{5} \text{ of } 30 = 9.60 \\
 3 \text{ " " } & = & \frac{1}{2} \text{ of } 6 = 4.80 \\
 \hline
 54 \text{ days' wages} & = & \$86.40
 \end{array}$$

4. What is the value of 336 yds. cloth, at  $18\frac{1}{4}$  cts. per yd.?

$$\begin{array}{lcl}
 12\frac{1}{2}\text{¢} = \frac{1}{8} \text{ of a dollar.} & & 8) \$336 \text{ value at } \$1 \text{ per yd.} \\
 6\frac{1}{4} = \frac{1}{2} \text{ of } 12\frac{1}{2}\text{¢.} & & \begin{array}{rcl}
 2) 42 & \text{" " } & 12\frac{1}{2}\text{¢} \\
 21 & \text{" " } & 6\frac{1}{4}\text{¢} \\
 \hline
 \text{Ans. } \$63 & \text{" " } & 18\frac{3}{4}\text{¢}
 \end{array}
 \end{array}$$

5. How much will 1232 bushels wheat cost, at  $\$1.31\frac{1}{4}$  per bushel?

$$\begin{array}{rcl}
 1232 & & \\
 1.31\frac{1}{4} & & \\
 \hline
 4) 1232 \text{ cost at } \$1.00 \text{ per bushel.} & & \\
 4) 308 & \text{" " } & 25\text{¢} \\
 77 & \text{" " } & 6\frac{1}{4}\text{¢} \\
 \hline
 \text{Ans. } \$1617 & \text{" " } & \$1.31\frac{1}{4}
 \end{array}$$

6. What will 28 bus. 3 pks. 4 qts. clover-seed cost at \$3.50 per bus.?

$$\begin{array}{rcl}
 \$98.00 & = & \text{cost of } 28 \text{ bus.} \\
 \frac{1}{2} \text{ of } 3.50 & = & 1.75 = \text{" } 2 \text{ pks.} \\
 \frac{1}{2} \text{ " } 1.75 & = & .87\frac{1}{2} = \text{" } 1 \text{ pk.} \\
 \frac{1}{2} \text{ " } .87\frac{1}{2} & = & .43\frac{3}{4} = \text{" } 4 \text{ qts.} \\
 \hline
 \text{Ans. } \$101.06\frac{1}{4} & = & \text{" } 28 \text{ bus. } 3 \text{ pks. } 4 \text{ qts.}
 \end{array}$$

7. What will 270 yds. silk cost, at £1 5s. 6d. per yard?  
*Ans.* £344 5s.
8. What will 326 bbls. flour cost, at \$7.87½ per bbl.?
9. Required the cost of 12 gals. 3 qts. 1 pt. of molasses, at 80 cts. per gallon.
10. What is the cost of 25 yds. 3 qr. carpet, at \$1.20 per yard?
11. What is the cost of 84 cu. yds. 24 cu. ft., at \$2.50 per cubic yard?
12. Find the cost of 15 acres 3 r. 20 rd. of land, at \$60 per acre.
13. What is the freight on 12 tons 17 cwt., at \$4 per ton?
14. What will 276 yards cloth cost, at \$2.16½ per yard?
15. What will 13 gal. 1 qt. 1 pt. wine cost, at \$3 per gal.?
16. Required the cost of 7 cwt. 3 qrs. 12 lbs., at \$61.50 per long ton.
17. What is the cost of 17 cwt. 2 qrs., at \$87.50 per ton?
18. Find the cost of 27 yards of cloth, at 3s. 9¼d. per yard.  
*Ans.* £5 2s. 11¼d.



## SPECIAL CONTRACTIONS.

### CALCULATIONS USED IN PARTICULAR BRANCHES OF BUSINESS.

162. To find the value of tons and hundredweights without the use of fractions.

*Rule.*—Multiply the number of hundredweights by 5, and annex the product to the tons, as so many hundredths of tons; then multiply by the given price per ton, and point off two decimals.

#### EXAMPLES.

1. What is the cost of 18 tons 17 cwt. coal at \$4 per ton?  
 $17 \times 5 = 85$      $18.85 \times 4 = 75.40$ .    *Ans.* \$75.40.
2. What is the cost of 35 tons 15 cwt. hay at \$12 per ton?
3. What is the cost of 48 tons 17 cwt. coal at \$6.50 per ton?

163. To find the value of shillings and pence in the decimals of a pound sterling.

*Rule.*—Multiply the shillings by 5, and call the product hundredths.

Multiply the pence by  $4\frac{1}{6}$ , and call the product thousandths.

The sum of these two values will be the decimal required.

## EXAMPLES.

1. Reduce 12s. 6d. to the decimal of a pound.

$$\begin{array}{r} 12 \times 5 = .60 \\ 6 \times 4\frac{1}{6} = .025 \\ \hline .625 \end{array}$$

2. Reduce £187 13s. 3d. to the decimal of a pound.

$$\begin{array}{r} 13 \times 5 = .65 \\ 3 \times 4\frac{1}{6} = .0125 \\ \hline .6625 \end{array} \quad \text{Ans. } £187.6625.$$

3. Reduce the following to decimals of a pound: £18 4s. 6d.; £25 12s. 8d.; £19 1s. 3d.; £320 11s. 7d.; 4s. 8d.; 6d.; £8 4d.

164. To change aunes to yards.

*Note.*—An aune is a French measure, equal to  $1\frac{1}{4}$  yards.

*Rule.*—Annex a cipher and divide by 8.

## EXAMPLES.

1. In 484 aunes, how many yards?

$$4840 \div 8 = 605 \text{ Ans.}$$

2. In 3848 aunes, how many yards? In 1265? In 1847?

*Note.*— $1\frac{1}{4} = \frac{3}{2}$ , or  $\frac{1}{2}$ . This rule can easily be applied to numerous other calculations. The contents of boards  $1\frac{1}{4}$  inches thick, etc., may be computed in this manner. See page 288.

165. To find how many gallons of linseed oil in a given number of pounds, at  $7\frac{1}{2}$  lbs. per gallon.

*Rule.*—Add one-third of the number of pounds to itself, and point off one decimal.

## EXAMPLES.

1. How many gallons in 675 lbs.?

$$\begin{array}{r} 675 \\ 225 = \frac{1}{3} \text{ of } 675 \\ \hline 90.0 \end{array}$$

*Ans. 90 gals.*

2. In 1846 lbs. how many gallons? in 675? in 339 lbs.?

166. To find the price per cental when the price per bushel is given.

**Note.**—A Cental is 100 pounds.

**Rule.**—*Multiply the price per bushel by 100, and divide by the number of pounds.*

## EXAMPLE.

At \$1.38 per bushel for wheat of the weight of 60 lbs. per bushel, what is the price per cental?

$$138 \times 100 = 13800. \quad 13800 \div 60 = 230. \quad \text{Ans. } \$2.30.$$

167. To find the price per bushel when the price per cental is given.

**Rule.**—*Multiply the price per cental by the number of pounds in a bushel, and divide by 100.*

## EXAMPLE.

At \$2.50 per cental, what is the price of a bushel of wheat?

$$250 \times 60 = 15000. \quad 15000 \div 100 = 150. \quad \text{Ans. } \$1.50.$$

## ANALYSIS.

168. **Analysis** is the process of reasoning from a given quantity to its unit, and then from the unit to the required quantity, or of comparing one number with another.

## EXAMPLES.

1. If 4 lbs. sugar cost 28 cts., what will 9 lbs. cost?

**Explanation.**—If 4 lbs. cost 28 cts., one pound will cost one-fourth of 28 = 7 cts., and 9 lbs. will cost nine times 7 cts. = 63 cents.

2. If  $\frac{3}{4}$  of a number is 45, what is that number?

**Explanation.**—If three-fourths of a number is 45, one-fourth will be one-third of  $45 = 15$ , and four-fourths equal 4 times  $15 = 60$ .

3. If  $\frac{3}{5}$  of a number is 14, what is  $\frac{4}{5}$  of that number?

**Explanation.**—If  $\frac{3}{5} = 14$ , one-fifth = one-half of  $14 = 7$ , and the number  $= 5 \times 7 = 35$ . Then  $\frac{4}{5}$  of  $35 = 28$ , *Ans.*

4. If 10 yards cost \$4.80, what will 40 yards cost?

In this example we can compare the number of yards directly instead of first finding what one yard will cost. As 40 yards will equal four times 10 yards, the cost will also be four times as much,  $\$4.80 \times 4 = \$19.20$ . Therefore, if 10 yards cost \$4.80, 40 yards will cost, at the same rate, \$19.20.

5. A owns  $\frac{1}{3}$  and B  $\frac{1}{4}$  of a ship, the remainder of the ship is valued at \$15,000, what is the value of A's and B's shares?

**Explanation.**— $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$ . Then as there are  $\frac{11}{12}$  in the whole vessel, the remainder must be  $\frac{11}{12}$ , which is worth \$15,000. Then, as in example 2,  $\frac{1}{12} = \$3000$ , and the whole or  $\frac{12}{12} = \$3000 \times 12 = \$36,000$ .

6. A owns  $\frac{1}{3}$  of a tract of land and B  $\frac{1}{4}$ . A's share is worth \$250 more than B's, how much is the land worth?

**Explanation.**—The difference between  $\frac{1}{3}$  and  $\frac{1}{4}$  is  $\frac{1}{12}$ , which is worth \$250. Then if  $\frac{1}{12} = \$250$ ,  $\frac{12}{12}$  or the whole will equal 24 times \$250, or \$6000.

7. Charles can do a piece of work in 6 days, and James can do the same in 3 days, how long will it take them if they work together?

**Explanation.**—If Charles can do a piece of work in 6 days, he can do  $\frac{1}{6}$  of it in 1 day. James can do  $\frac{1}{3}$  in 1 day,  $\frac{1}{6} + \frac{1}{3} = \frac{1}{2}$ . If they can do  $\frac{1}{2}$  in 1 day, they can do the whole or  $\frac{2}{2}$  in 2 days.

8. A post stands  $\frac{1}{3}$  in the ground,  $\frac{2}{3}$  in the water, and 14 feet in the air, how long is the post?

9. A and B can build a boat in 6 days, but if C assists them they can do it in 4 days, how long would it take C to do it alone?

10. A wall was raised 8 feet by 6 men in 12 days, how many men must be employed to raise it to 32 feet in 6 more days?

11. One man earns 6 times as much as another; both earn \$280. How much did each earn?

12. What number multiplied by 79 will give the same result as 257 multiplied by 553?

## PERCENTAGE.

**169. Percentage** is a method of computing by hundredths.

The term *per cent.* is an abbreviation of the Latin words *per centum*, and signifies by the hundred.

**170. The rate per cent.** is the number of hundredths.

Per cent. is simply the proportion of a hundred, and is not any of the denominations of Federal money. Ten per cent. is not 10 cents, nor 10 dollars, but  $\frac{10}{100}$ ; 10 per cent. of \$50 = \$5; 10 per cent. of 85 bbls. =  $8\frac{1}{2}$  bbls.;  $\frac{1}{4}$  per cent. =  $\frac{1}{4}$  of  $\frac{1}{100}$  =  $\frac{1}{400}$  or .00125.

The rate may be expressed by the sign %, or as a decimal, or as a common fraction. Thus:

|                  |   |                  |   |       |   |   |
|------------------|---|------------------|---|-------|---|---|
| 1 per cent.      | = | 1 %              | = | .01   | = | $\frac{1}{100}$ .                       |
| 2 "              | = | 2 %              | = | .02   | = | $\frac{2}{100}$ or $\frac{1}{50}$ .     |
| 5 "              | = | 5 %              | = | .05   | = | $\frac{5}{100}$ or $\frac{1}{20}$ .     |
| 10 "             | = | 10 %             | = | .10   | = | $\frac{10}{100}$ or $\frac{1}{10}$ .    |
| 25 "             | = | 25 %             | = | .25   | = | $\frac{25}{100}$ or $\frac{1}{4}$ .     |
| 50 "             | = | 50 %             | = | .50   | = | $\frac{50}{100}$ or $\frac{1}{2}$ .     |
| 100 "            | = | 100 %            | = | 1.00  | = | $\frac{100}{100}$ or 1.                 |
| 125 "            | = | 125 %            | = | 1.25  | = | $\frac{125}{100}$ or $1\frac{1}{4}$ .   |
| $\frac{1}{4}$ "  | = | $\frac{1}{4}$ %  | = | .0025 | = | $\frac{25}{10000}$ or $\frac{1}{400}$ . |
| $\frac{1}{2}$ "  | = | $\frac{1}{2}$ %  | = | .005  | = | $\frac{5}{1000}$ or $\frac{1}{200}$ .   |
| $2\frac{1}{2}$ " | = | $2\frac{1}{2}$ % | = | .025  | = | $\frac{25}{1000}$ or $\frac{1}{40}$ .   |

Percentage is used in most commercial calculations, such as Interest, Commission, Insurance, Profit and Loss.

## EXERCISE.

Express in decimal form

|         |           |                        |                          |
|---------|-----------|------------------------|--------------------------|
| 1. 20%. | Ans. .20. | 5. 17%.                | 9. 250%.                 |
| 2. 50%. | Ans. .5.  | 6. 108%.               | 10. 20 $\frac{1}{2}$ %.  |
| 3. 75%. | Ans. .75. | 7. 12 $\frac{1}{2}$ %. | 11. $\frac{1}{2}$ %.     |
| 4. 80%. |           | 8. 37 $\frac{1}{2}$ %. | 12. $\frac{80}{1000}$ %. |



Express in fractional form in their lowest terms:

|         |                      |                        |                         |
|---------|----------------------|------------------------|-------------------------|
| 1. 25%. | Ans. $\frac{1}{4}$ . | 5. $33\frac{1}{3}\%$ . | 9. 175%.                |
| 2. 40%. | Ans. $\frac{2}{5}$ . | 6. $37\frac{1}{2}\%$ . | 10. 250%.               |
| 3. 75%. | Ans. $\frac{3}{4}$ . | 7. $62\frac{1}{2}\%$ . | 11. 5%.                 |
| 4. 80%. |                      | 8. 125%.               | 12. $16\frac{2}{3}\%$ . |

What rate per cent. are the following?

|                    |                          |                     |           |
|--------------------|--------------------------|---------------------|-----------|
| 1. $\frac{1}{4}$ . | Ans. 25%.                | 5. $\frac{3}{8}$ .  | 9. .025.  |
| 2. $\frac{1}{5}$ . | Ans. $33\frac{1}{3}\%$ . | 6. $1\frac{1}{4}$ . | 10. .75.  |
| 3. $\frac{3}{4}$ . |                          | 7. 3.               | 11. .008. |
| 4. $\frac{5}{8}$ . |                          | 8. $\frac{7}{8}$ .  | 12. .625. |

171. The **Base** is the number on which the percentage is reckoned.

172. The **Percentage** is the value of that part of a number which is indicated by the rate.

173. The **Amount** is the sum of the base and the percentage.

174. The **Difference** is the excess of the base over the percentage.

To find the percentage of denominate numbers, including Sterling Money, see Art. 179, page 111.

## PROBLEMS IN PERCENTAGE.

### CASE I.

175. To find the percentage, the base and rate being given.

*Rule.*—Multiply the base by the rate expressed decimally, or multiply the base by the rate and divide the product by 100.

**Base**  $\times$  **Rate** (as a decimal) = **Percentage**.

### EXAMPLES.

1. What is 6% of 200?

$$\begin{array}{lll} \text{Base.} & \text{Rate.} & \text{Percentage.} \\ 200 \times .06 & = & 12.00. \end{array}$$

Ans. 12.

2. What is 6% of \$26.45?

$$26.45 \times 6 = 158.70.$$

Ans. \$1.58  $\frac{7}{10}$ .

*Note.*—The figures on the left, after pointing off, are of the lowest denomination in the number multiplied. If there are cents in the given number, two more places must be pointed off for cents.

3. What is 5% of 120? Of 500? Of 1200? Of 480?
4. What is 3% of \$2500? 5% of \$950? 10% of \$37.50?
5. Find  $12\frac{1}{2}\%$  of 184 bushels. 20% of  $42\frac{1}{2}$  gallons.
6. A man bought goods for \$145.75, and sold them at a profit of 12%, how much did he make?
7. A man owns property assessed at \$13,600 and pays a tax of  $1\frac{1}{2}\%$ , how much does he pay?
8. A man bought two pieces of cloth for \$2.40 each; on one piece he made a profit of  $\frac{1}{3}$ , on the other he gained  $16\frac{2}{3}\%$ , how much more did he gain on one piece than on the other?
9. What is 5% of \$325.60? Ans. \$16.28.

In the above we have two terms given to find a third. By Arts. 21 and 22, page 25, if we have any two of the terms we can find a third, taking the base as the multiplicand, the rate as the multiplier, and the percentage as the product.

#### CASE II.

**176. To find the rate, the base and percentage being given.**

*Rule.*—Annex two ciphers to the percentage and divide by the base.

*Note.*—Annexing two ciphers to the percentage is the same as multiplying by 100, and restores the percentage to its original condition before pointing off.

$$\text{Percentage} \div \text{Base} = \text{Rate (as a decimal).}$$

#### EXAMPLES.

1. What rate per cent. of 200 is 12?  
 $12 \div 200 = .06$ .      $1200 \div 200 = 6$ .     Ans. 6%.
2. 6 is what per cent. of 120? 25 is what per cent. of 500?
3. A man bought goods for \$300, and gained \$75, what per cent. did he gain?
4. A firm commenced business with \$12,000, and lost \$1800, what per cent. of their capital did they lose?
5. What per cent. of 450 is 150? Of 1700 is 85? Of 3750 tons is 760 tons? Of 4120 is 618? Of 640 acres is 512 acres? Of 3000 pounds is 510 pounds?
6. A student at an examination in which 50 questions were asked, answered 45 correctly, what per cent. of the questions did he answer?

CASE III.

177. To find the base, the rate and percentage being given.

*Rule.*—Annex two ciphers to the percentage and divide by the rate. Or, divide the percentage by the rate expressed as a decimal or a common fraction.

Percentage  $\div$  Rate (as a decimal) = Base.

1. A farmer lost 164 sheep, which was 40% of his flock, how many were in his flock at first?

$$\begin{array}{l} 16400 \div 40 = 410 \quad \text{Or, } 164 = 40\% \\ 164 \div \frac{40}{100} = 410 \quad 164 \div 40 = 4.1 = 1\% \\ 164 \div .40 = 410 \quad 4.1 \times 100 = 410 = 100\% \end{array}$$

What is the number of which

- |   |                      |
|---|----------------------|
| 2. 300 is 60% ?    Ans. 500.  | 6. 750 is 300% ?     |
| 3. 1000 is 33 $\frac{1}{3}$ % ?    3000.  | 7. 1820 is 227.5% ?  |
| 4. 1428 is 71.4% ?  | 8. 9260 is 2315% ?   |
| 5. 3264 is 816% ?   | 9. 49176 is 16192% ? |
| 10. 48 is $\frac{1}{3}$ of what number?    16% of what number?  |                      |
| 11. 40 is $\frac{1}{3}$ of one number and 10% of another number, what is the difference between the two numbers?                                  |                      |
| 12. A man insured his house and paid \$180, which was at the rate of 2 $\frac{1}{4}$ % on the amount insured, for how much was his house insured? |                      |
| 13. A man who owned a vessel sold 25% of it for \$4250, at that rate what was the vessel worth?   |                      |
| 14. 32 is $\frac{1}{4}$ % of what number?    160 is $\frac{80}{100}$ % of what number?  |                      |
| 15. $\frac{3}{8}$ is 25% of what?    .0375 is 6 $\frac{1}{4}$ % of what?  |                      |
| 16. $\frac{1}{16}$ is 33 $\frac{1}{3}$ % of what?    1875 is 66 $\frac{2}{3}$ % of what?  |                      |

CASE IV.

178. To find the base, the rate and the amount, or the rate and difference being given.

*Rule.*—Divide the amount by 1 increased by the rate per cent. (expressed decimally).

Divide the difference by 1 diminished by the rate per cent. (expressed decimally).

**Amount**  $\div$  **1 + Rate** (expressed decimally) = **Base**.  
**Difference**  $\div$  **1 - Rate** (expressed decimally) = **Base**.

## EXAMPLES.

1. What number and 20% of itself equals 600?

$$600 = 100\% + 20\% \text{ of the number required.}$$

$$600 \div 1.20 = 500 \text{ Ans.}$$

$$500 = 100\%$$

$$100 = 20\%$$

$$600 = 120\%$$

2. What number diminished by 20% of itself equals 400?

$$100 - 20 = 80\% = 400$$

$$400 \div .80 = 500$$

$$500 = 100\%$$

$$100 = 20\%$$

$$400 = 80\%$$

3. 330 is 10% more than what number?
4. 4480 increased by  $12\frac{1}{2}\%$  of itself is equal to what number?
5. 2460 diminished by 40% of itself equals what number?
6. 140 diminished by  $12\frac{1}{2}\%$  of itself equals what number?
7. 24 is  $33\frac{1}{3}\%$  more than what number?
8. 540 is 10% less than what number?
9. 75 is 10% less than what number?
10. A merchant has a capital of \$36,800, which is an increase of  $33\frac{1}{3}\%$  on his investment, how much did he invest?
11. A man bought 30% more of cotton goods than woollen, and both cost him \$1840, how much did he buy of each?

## MISCELLANEOUS EXAMPLES IN PERCENTAGE.

1. If a merchant who buys goods on 6 months' credit is allowed a deduction of 5% for paying his bill within 30 days, what can he save on a bill of \$560? How much on \$3650?
2. If a man fails to pay his water rent until he is charged 12% for delay, how much will he lose if his water rent is \$18.75?
3. If 1% per month, counting from the time of payment, is allowed on all taxes paid before July 1st, and 1% per month charged on all taxes remaining unpaid thereafter, how much more does A pay than B, if B pays his taxes Feb. 1st, and A pays his taxes Nov. 1st, their tax-bills being each \$180?

4. A merchant owes \$6500, and his property is worth only \$5425. What per cent. of his debt can he pay?

5. A man shipped 3800 bbls. of flour to England, and during a storm 19 bbls. were thrown overboard. What per cent. was lost?

6. If I have \$374.50 in currency, how much gold can I buy when it sells at a premium of 7%?

7. The population of a certain village increased in 5 years from 6000 to 7800. What was the average rate of increase per year?

8. What is the difference to a salesman between selling a bill of \$1000, on which there is a profit of \$100 of which he receives  $\frac{1}{4}$ , and selling the same amount for a commission of  $1\frac{1}{2}$  per cent.? What will be the difference to the firm if the goods are sold for \$950 instead of \$1000, and what the difference to the salesman if sold at  $1\frac{1}{2}$ % commission?

9. A merchant sold a lot of cloth at \$3 per yard, and thereby gained 20 per cent. What per cent. would he have gained if he had sold the cloth at \$3.75 per yard?

For additional examples in Percentage, see Commission, Profit and Loss, Insurance, etc.

179. The percentage of denominate numbers may be obtained by reducing a compound denominate number to the lowest denomination contained in it, or to the decimal of the highest, and then proceeding as in simple numbers. Or,

Multiply each denomination by the rate, and divide the different products by 100; then reduce each remainder, beginning with the highest denomination to the next lower, and add the number of that next lower, pointing off the whole numbers after each reduction.

1. What is 5 per cent. of 62 T. 17 cwt. 3 qr.?

$$\begin{array}{r}
 62 \text{ T. } 17 \text{ cwt. } 3 \text{ qr.} \\
 \quad \quad \quad 5 \\
 \hline
 3.10 \quad .85 \quad .15 \\
 \quad 20 \\
 \hline
 2.85 \\
 \quad 4 \\
 \hline
 3.55
 \end{array}$$

*Ans. 3 T. 2 cwt. 3.55 qr.*

## COMMISSION, BROKERAGE, ETC.

180. **Commission** is the charge made by Factors, or Commission Merchants, Brokers, and other agents, for buying and selling merchandise, stocks, etc., making collections, or transacting any other business for another. It is usually calculated at so much per cent. on the amount of money received or expended.

181. **A Broker** is one who makes a bargain for another, but who has not the goods in his possession.

182. **Guarantee** is the charge made for assuming the risk of loss from non-payment by the purchaser.

183. **The Consignment** is the quantity of goods sent to be sold; the person who sends them is called the **Consignor** or **Shipper**; the commission merchant, or person to whom the goods are sent, is called the **Consignee** or **Correspondent**. (*See Account Sales.*)

184. The excess of the amount of sales or collections over the charges, is called the **Net Proceeds**.

185. Stocks are usually bought and sold at a certain per cent. on their *par value*, or at so much per share.

(*See The Stock Exchange.*)

186. **Rates of Commission Adopted by Philadelphia Merchants.**

The charges for selling flour, grain, seeds, and other produce shall be  $2\frac{1}{2}$  per cent. on the gross amount of sales, and the incidental expenses, handling, cooperage, measuring, fire insurance, etc., shall be charged in addition.

That, in order to secure uniformity, these incidental expenses shall be as follows, viz. :—

On flour, not less than 8 cents per barrel for labor, 8 cents per barrel for inspection and cooperage, 8 cents per barrel for storage for first month or fraction thereof. (*See Storage*, page 166.)

On grain, when received by rail in private warehouses,  $1\frac{1}{2}$  cents per bushel for measuring, storage, and labor, for one month or fraction thereof; and when in elevator or grain depot the actual expenses shall be charged.

On wheat and other grain, when received afloat,  $1\frac{1}{2}$  cents per bushel for measuring, and actual expenses incurred when stored, which shall not be less than the charge made by rail.

The rate of insurance shall not be less than  $\frac{1}{2}$  of 1 per cent. per month or fraction thereof.

After the first month shall have expired, the charge for storage shall not be less than 5 cents per barrel per month, or fraction thereof, on flour, and 1 cent per bushel on grain.

These charges shall be made upon all consignments of produce.

In all cases where acceptances are made on produce, in anticipation of sales, the commission merchant shall be at liberty to sell, in order to meet the drafts at maturity.

Delivery will be accomplished on the part of the seller when he places at the door of his warehouse flour or meal in a position to be removed by the purchaser's porters or stevedores; and grain, when pointed out to the purchaser or his agent.

The expenses of towing and wharfage of boats and vessels shall be paid by the purchaser of the cargo, when moved for his accommodation.

The commission for buying and selling grain at the Call Board of the Commercial Exchange shall not be less than 2 cents per bushel on wheat, and 1 cent on all other grain.

When the grain is not actually handled, but a purchase is made to fill the contract, one commission only shall be charged.

When more than ten days' credit is asked by the purchaser, and granted, settlement shall be made by note, with interest added from date of sale, if demanded by the seller.

### EXAMPLES IN COMMISSION.

1. Received \$245 for selling goods at a commission of 5%. How much did I sell? (*See Percentage.*)

$$245 \times 100 = 24500$$

$$24500 \div 5 = 4900. \quad \text{Ans. } \$4900.$$

2. A broker purchased for me 50 shares of railroad stock, of the par value of \$50 per share. His charge was  $\frac{1}{2}$ %. How much did I pay him?

3. A country trader buys through a commission merchant an invoice of goods for \$2550. The commission merchant charges 2 $\frac{1}{2}$ % for buying. How much must the trader remit to pay for the goods and commission?

4. Thomas & Sons sold for me, at auction, a lot of goods to the amount of \$14,500. Their charges are as follows:—Com-

mission,  $2\frac{1}{2}\%$  ; guarantee,  $2\frac{1}{2}\%$  ; advertising, \$22.50 ; drayage, labor, and storage, \$32.50. How much is due me ?

5. A house was sold for \$2400, which was 80% of its cost. What was the cost ?

6. Paid a broker \$24 for investing money in bank stock for me, selling at par at a commission of  $\frac{1}{4}\%$ . How much did he invest ?

7. Paid a merchant 3% commission, and received \$3880 as net proceeds. What was the amount of sales ?

8. What number diminished by 3% of itself is equal to 776 ?

9. Received, as net proceeds of a consignment, \$760, after paying  $2\frac{1}{2}\%$  commission for selling. What was the amount of sales ?

10. Received \$224 dividend on 50 shares railroad stock, which cost \$3200. What was the rate per cent. ?

11. An agent sold property for \$18,240, and received \$121.60. What was the rate of commission ?

12. If I pay a commission merchant \$125 for commission and guarantee on a sale of \$2500, what rate does he receive ?

13. A commission merchant wishes to buy exchange with the net proceeds of a sale amounting to \$714. The rate of exchange is 2%. How large a bill can he buy ? *Ans.* \$700.

14. A Cuban merchant wishes to draw on New York for an amount which will leave him the sum of \$6141.39, after paying a premium of  $4\frac{1}{2}\%$  for negotiating and exchange. For how much must he draw ? *Ans.* \$6430.77.

15. A merchant received \$525, with which to buy goods. He is to receive a commission of  $2\frac{1}{2}\%$  on the amount of purchase, for buying. How much is his commission, and what is the amount of purchases ?

16. I have remitted \$3600 to my agent in Montpelier, with which to buy wool, first deducting his commission of 3% for purchasing. How much will he expend for wool ? How much will be his commission ?

17. A commission merchant sold goods for \$6262, and received \$150, which included a charge for freight of \$9.34. What rate of commission did he receive ?

18. J. B. Myers & Co. sell for me a quantity of dry-goods on commission at 6%. How much must be sold that my agent can buy flour with the proceeds to the value of \$5400, after retaining his commission, for buying, of  $2\frac{1}{2}\%$  ?



19. Sold goods at 2<sup>2</sup>% commission, which I invested in sugars, and sold them at a profit of 15 per cent., realizing a gain of \$240. How much commission did I receive, and how much did the goods sell for?

20. A merchant purchased an invoice of grain, which, including a commission of 1½%, cost \$5050.65. The freight charges were \$15.35. He sold the grain at a profit of 15% on the entire cost, and invested the proceeds in sugar, which he sold at a profit of 5%. What was the amount paid for commission? What the entire cost of the grain, and how much were his profits?

*Ans.* Com. \$56.19; cost of grain, \$5066.00; profits, \$1051.19.

21. A commission merchant bought goods for which he received 5% commission for buying and \$63.25 for charges. The total cost of goods, commission, and charges was \$3250. What was paid for the goods?

22. An agent bought coffee at ¾% brokerage, and received \$350. He afterwards sold the coffee at a profit to his principal of \$5160, after deducting 1½% commission on the amount for which it was sold. How much was his commission?

## INSURANCE.

**187. Insurance** is a contract of indemnity by which one party engages, for a stipulated sum, to insure another against a loss or injury to which he may be exposed.

**188. The Insurer** is the person who takes the risk. He is sometimes called the Underwriter, from the custom of individual insurers writing their names, together with the amounts for which they will be responsible, *under* a description of the property insured.

**189. The Premium** is the sum paid for insurance, and is a percentage on the amount insured.

**190. A Survey** is an examination of the property to ascertain its value and the danger to which it is exposed.

**191. The Policy** is the instrument containing the contract, and describes the property or person insured, and the terms on which the insurance is effected.

**192. Insurance companies** are generally incorporated

bodies ; but persons, such as commission merchants, shippers, and others, insure, at times, as well as companies.

**193. Mutual Insurance Companies** are those in which the persons insured become members of the company, and liable to a certain extent for its losses ; they also share in the gains of the company, if any.

**194. Policies** are of two kinds,—**Open Policies**, and **Closed or Valued Policies**.

**195. A Valued or Closed Policy** is one in which the amount insured is definitely determined at the time the insurance is effected. Houses, furniture, and goods in store are insured in policies of this kind.

**196. An Open Policy** is one upon which amounts yet to be ascertained and insured may be entered at different times. (See page 119.) They are used by persons who insure goods which are to be conveyed from one place to another. The person taking an open policy gives a note, called a *Premium Note*, to the insurance company, as security for the premium on the amounts he anticipates insuring before the date on which the note matures. This note at maturity is returned to him on payment of the premiums on the amounts he has had insured. A nominal premium is mentioned in the policy when made out, but actual premiums are fixed at the time the risk is reported, and are regulated by a scale of prices arranged by the company.

When the insurance is on goods to be imported from a foreign country, the value of the currency of that country is also stated. As it is customary to insure for about 10% more than the cost of the invoice, this is included in the valuation of the foreign currency. English money is thus estimated at \$5.25 per pound sterling.

When the insured ships goods, or receives information of goods shipped to him, he must notify the insurance company as soon as he is in receipt of bill of lading or other advice of shipment, that it may be entered on the open policy.

Some open policies which insure invoices shipped abroad, contain the clause that "no risk shall attach until the amount and description of the same shall be approved and indorsed thereon by the company, and to be valued at the sum so in-

dorsed ;" but open policies designed to cover goods to be received will cover all consignments if reported immediately on receipt of bill of lading or advice of shipment. In all open policies, to the description of the property are added the words "lost or not lost," so as to include all goods not known to be actually lost.

197. To guard against fraud, property is not usually insured for its full value, and no more can be recovered than the amount of actual loss. The party insured must also have an interest in the property insured. For this reason, when property is sold, the policy of insurance, if any, must be transferred on the books of the insurance company to be of any value to either party. When goods or furniture are destroyed, a full enumeration or description of the property must be given.

Dwelling-houses, and permanent property about the value of which opinions differ, and which deteriorate in time, may generally be insured for from one-half to three-fourths their estimated value ; goods at sea, or in transportation, from 5 per cent. to 25 per cent. more than their cost or invoice price, in order to cover the expenses of freight, insurance, and a share of the profits ; goods in store, at their cash value ; but the goods are not usually specified until a fire has occurred.

198. Insurance companies will not insure more on any one risk than a stated amount, which usually ranges from \$3000 to \$20,000, according to the capital of the company insuring, and the hazard of the risk. They will frequently, however, take a larger amount, and then reinsure themselves for part in another company.

199. The rate for insuring varies according to the degree of risk incurred, either from original liability, or from the difficulty of preservation or recovery when fires take place ; and some property is so hazardous that insurance companies decline to insure it at any rate. On private dwellings the rates are about 2 per cent. for a perpetual policy, and  $\frac{1}{4}$  of 1 per cent. annually ; goods at sea, from  $\frac{1}{4}$  per cent. to 3 per cent.

The following rates are taken from those adopted by the New York Board of Fire Underwriters :

For insuring \$100 in dry-goods, groceries, boots and shoes,

crockery, furs, leather, paper, wine and liquors, dry drugs, carpets, jewellers' stocks, from 55 to 95 cents. Retail stocks of tobacco and cigars, books and stationery, music and prints, organs, wood and hollow ware, hats and caps with manufacturing, cabinet ware, paints and oil, toys, vessels in port, from 90 cents to \$1.20 per \$100. Wholesale drugs, steam tug-boats, steam and sail vessels, lumber-yards, from \$1.25 to \$1.65. Tar, naval stores, sugar-houses, from \$1.50 to \$2.50.

200. The advantages to commerce from insurance are immense. "Without the aid that it affords, comparatively few individuals would be found disposed to expose their property to the risk of long and hazardous voyages; but by its means insecurity is changed for security, and the capital of the merchant whose ships are dispersed over every sea, and exposed to all the perils of the ocean, is as secure as that of the agriculturist." The dangers from not being insured are so many and so great that none but millionaires can afford to remain uninsured; and it is considered by some a moral duty to insure in all cases where the interests of creditors or of one's family are in danger from the omission of it.

#### EXAMPLES IN INSURANCE.

1. What is the premium for insuring \$4500 @ 1<sup>2</sup>% ?

$$4500 \times 1\frac{1}{2} = 67.50. \quad \text{Ans. } \$67.50.$$

2. What will it cost to insure a house for \$2000 at a premium of 2%, the policy and survey costing \$1.20 ?

3. If the premium on a perpetual policy is 2%, which will be returned on payment of 5% of the premium, what is the difference in the cost of a perpetual policy insuring a house valued at \$4000, and returned at the end of four years, and an annual policy taken at a premium of  $\frac{1}{4}$  of 1% per year for the same time ?

$$4000 @ 2\% = 80. \quad 5\% \text{ of } 80 = 4.$$

$$4000 @ \frac{1}{4}\% = 10. \quad 10 \times 4 = 40. \quad 40 - 4 = 36.$$

$$\text{Ans. } \$36.$$

4. What is the cost of insuring furniture worth \$3000, at a premium of 80 cents per \$100, the policy and survey costing \$1.50 ?

# HOOD, BONBRIGHT & CO.'S OPEN POLICY WITH THE DELAWARE INSURANCE COMPANY.

## OPEN POLICY.

| Name of Vessel. | Place of Shipment. | Place of Destination. | Time of Sailing. | Amount of Invoice in Foreign Currency. | Value of Currency. | Valuation agreed upon in American Currency. | Rate.            | Premium. | Date of Approval. | Signatures.                      |
|-----------------|--------------------|-----------------------|------------------|--|--------------------|---|------------------|----------|-------------------|----------------------------------|
| Oriola.....     | Liverpool          | Philad'a.....         | 1882.<br>March 1 | £10,000                                | \$5.00 per £       | \$50,000.00                                 | $\frac{1}{2}\%$  | \$375.00 | Mar. 15           | R. G. Gray,<br><i>Secretary.</i> |
| Cutwater.....   | London ...         | New York..            | " 3              | 5,250                                  | "                  | 26,250.00                                   | $1\frac{1}{2}\%$ | 393.75   | Apr. 5            | R. G. Gray.                      |
| Julia Trundy    | Liverpool          | "                     | " 5              | 2,875                                  | "                  | 14,375.00                                   | 1%               | 143.75   | " 30              | R. G. Gray.                      |
| Blue Nose.....  | "                  | Philad'a.....         | " 27             | 6,000                                  | "                  | 30,000.00                                   | $1\frac{1}{2}\%$ | 375.00   | " 15              | R. G. Gray.                      |
| City of Boston  | "                  | "                     | April 14         | 500                                    | "                  | 2,500.00                                    | 2%               | 50.00    | May 2             | R. G. Gray.                      |
| Lafayette.....  | "                  | "                     | " 19             | 340                                    | "                  | 1,700.00                                    | $1\frac{1}{2}\%$ | 25.50    | " 10              | R. G. Gray.                      |
| Aurora.....     | Havre.....         | New York..            | " 25             | fr. 32,450                             | 25¢ per fr.        | 8,112.50                                    | 1%               | 81.13    | " 15              | R. G. Gray.                      |
| Kangaroo.....   | "                  | Philad'a.....         | May 3            | fr. 25,000                             | "                  | 6,250.00                                    | $1\frac{1}{2}\%$ | 93.75    | " 22              | R. G. Gray.                      |
| Wm. S. Balch    | Liverpool          | "                     | " 10             | £4,200                                 | \$5.00 per £       | 21,000.00                                   | $1\frac{1}{2}\%$ | 262.50   | " 25              | R. G. Gray.                      |

The above illustrates the manner of entering amounts insured on open policy. The terms of the policy are omitted, for want of space. The calculations should all be performed by the student.

5. A merchant insured his goods to the amount of \$5000 in one company at a premium of  $1^2\%$ , and \$2800 in another company at a premium of  $1^1\%$ . The policies cost \$1 each. What did he pay in all ?

6. If I take a risk of \$10,000 at a premium of  $1^2\%$ , and reinsure it at  $1^1\%$ , what will be my gain ?

7. If I take a policy covering goods in my store for 1 year, to the amount of \$15,000, at a premium of  $1^2\%$ , and within that time I insure consignments to the amount of \$23,000, at the same rate, how much do I gain ?

8. At  $\frac{1}{3}$  of  $1\%$  per month, what will be the cost of insuring goods worth \$2800 which remain in store 3 months ?

9. Effected insurance on a cargo from Liverpool, worth £1872 11s. 5d., at a premium of  $1^2\%$ . What is the premium, the pound sterling being valued at \$5.25 ?

## INTEREST.

**201. Interest** is compensation for the use of money or value.

**202. The Principal** is the sum for the use of which interest is charged.

**203. The Rate** is the number of hundredths of the principal that is paid for its use : as,  $6\%$  yearly,  $\frac{1}{2}\%$  monthly.

**204. The Amount** is the sum of the principal and interest.

**205. Simple Interest** is interest on the principal only.

**206. Compound Interest** is interest on the principal and on interest for a previous period.

**207. Legal Interest** is the rate established by law. Usury is interest greater than the legal rate, and is prohibited by law. In some States, however, parties are allowed to give and receive higher than legal rates by special contract. In ancient times all interest was called usury.

**208.** When no rate is mentioned, the legal rate is always understood. Debts of all kinds draw interest from the time they become due, but not before, unless specified. Compound interest, or interest on interest, remaining unpaid, is considered illegal.

**209.** The rates in the different States and Territories are as follows :

**Six per cent.**—In Arkansas, Delaware, District of Columbia, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Mississippi, Missouri, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia, West Virginia.

**Seven per cent.**—Connecticut, Dakota, Georgia, Kansas, Michigan, Minnesota, Nebraska, Nevada, South Carolina, Wisconsin.

**Eight per cent.**—Alabama, Florida, Texas.

**Ten per cent.**—Arizona, California, Colorado, Idaho, Montana, Oregon, Utah, Washington Territory.

**Twelve per cent.**—Kansas, Wyoming.

**Five per cent.**—Louisiana.

Debts due the United States bear six per cent. interest.

The legal rate in England and France is five per cent. ; in Canada, Nova Scotia, New Brunswick, and Ireland six per cent.

In the following States and Territories a higher than the legal rate is allowed by special contract:—

Arizona, Florida, Idaho, Maine, Massachusetts, Montana, New Mexico, Rhode Island, Utah, Washington Territory, Wyoming. Also in Canada, New Brunswick, and Nova Scotia.

**210.** In Pennsylvania, commission merchants and agents of parties not residing in the State are authorized to enter into an agreement to pay a rate not exceeding 7% on balances of money remaining in their hands, and to receive a rate not exceeding that amount, for advances of money made by them on consignments from persons living and transacting business beyond the limits of the State.

## COMPUTING TIME.

**211.** Most merchants settle their accounts semi-annually, or oftener, and the interest is calculated for days. The interest on Notes and Bonds which have some time to run is generally calculated for months and days.

**212.** To find the time between two dates, omit the day of the date and include the day of maturity.

For instance, if Tuesday is the tenth day of the month, to the next Tuesday, the seventeenth, is seven days ; but if both

Tuesdays are included, we have eight days ; if both are omitted, only six days.

**213.** When months are mentioned, they are construed to mean calendar months, by which is meant the time from one day in one month to the same day in another month.

Notes or securities falling due on the 30th or 31st of any month which has only 28, 29, or 30 days in it, are considered to be nominally due on the last day of the month, and therefore legally due on the 3d of the following month. For instance, a note dated November 30th, payable 3 months after date, falls due on the last day of February, and three days of grace make it payable on March 3d. Less than a month is reckoned at the rate of 30 days to the month.

**214.** When it is required to find the difference between two dates in years, months, and days, it may be done as in Subtraction of Compound Numbers.

#### EXAMPLE.

What is the difference in time between July 15th, 1865, and September 19th, 1862 ?

The earlier date is placed under the later, and the numbers of the months are written instead of their names.

| Yr.   | mo. | da.  |
|-------|-----|------|
| 1865  | 7   | 15   |
| 1862  | 9   | 19   |
| <hr/> |     |      |
|       | 2   | 9 26 |

**215.** As the number of days in the different months varies, counting time by days is the only exact method, when the dates are less than a year apart.

From Jan. 1, 1867, to July 1, 1867, is 6 mos., containing 181 days.

" Sept. 1, " " Mar. 1, 1868, " 6 " " 182 "

" Apr. 1, " " Oct. 1, 1867, " 6 " " 183 "

" Mar. 1, " " Sept. 1, " " 6 " " 184 "

**216.** The number of days between two given dates may be found as in the following example :—

What is the number of days between January 5th and July 3d ?



Add the number of days in January  
after the 5th to the days in the  
intervening months, and the three  
days in July.

|         |     |       |
|---------|-----|-------|
| In Jan. | 26  | days. |
| " Feb.  | 28  | "     |
| " Mar.  | 31  | "     |
| " Apr.  | 30  | "     |
| " May   | 31  | "     |
| " June  | 30  | "     |
| " July  | 3   | "     |
| <hr/>   |     |       |
| Total,  | 179 | "     |

217. Or, call each month 30 days, and correct by adding one for every month intervening which contains 31 days, and subtract two for February, except in leap-years; then but 1. In the example already given, from Jan. 5th to July 3d, there are five whole months, two of which contain 31 days, and one, February, contains but 28. They consequently average 30 days each, making 150, which, with 26 days in January and 3 days in July, make a total of 179.

Time Tables will be found useful for ascertaining the time between different dates. (*See Time Table*, page 165.)

218. It is sometimes desirable to know for what time to draw a note so that it will not fall due on a Sunday or a holiday. After finding the number of days, divide by 7 to obtain the number of weeks and days, then count the odd days from the day of the week on which the note is dated. In the example given, 179 days = 25 weeks and 4 days. If January 5th was on Monday, then July 3d will be the fourth day from Monday, or on Thursday.

219. The following may be useful to those who have frequent occasion to draw notes :—

33 days = 4 weeks and 5 days, 63 days = 9 weeks, 93 days = 13 weeks and 2 days: therefore,

A note at *thirty* days will fall due *five* days later than the day of the week on which it was given.

A note at *sixty* days will fall due on the *same day* of the week.

A note at *ninety* days will fall due *two* days later.

220. It is customary among business men, in reckoning interest, to consider the year as consisting of 12 months of 30 days each, or 360 days. As there are 365 days in a year, this gives  $\frac{5}{365}$ , or  $\frac{1}{72}$ , too much. The difference is so small, however, that in ordinary transactions it is not noticed. The mer-

cantile custom has in many cases been sanctioned by law. In New York, the law on this subject (Rev. Stat., vol. ii., page 182) reads as follows :—

“ For the purpose of calculating interest, a month shall be considered the twelfth part of a year, and as consisting of thirty days ; and interest for any number of days less than a month shall be estimated by the proportion which such number of days shall bear to thirty.”

**221.** In computing interest the element of **TIME** is to be considered in connection with the principles of percentage already given.

**222.** To Find the Interest at any Rate per cent. per annum for any Time.

*Rule 1.*—Multiply the principal by the rate, expressed as a decimal. The product will be the interest for 1 year.

Multiply this interest by the time expressed in years and fractions of a year ; the result will be the interest required.

#### EXAMPLE.

1. What is the interest on \$750 for 2 years and 6 mos. @ 4% ?  
What is the amount ?

$$\begin{array}{r}
 \$750 \\
 .04 \\
 \hline
 \$30.00 \text{ Int. for 1 year.} \\
 2\frac{1}{2} \text{ years.} \\
 \hline
 \$60.00 \\
 15.00 \\
 \hline
 \$75.00 \text{ Interest.} \\
 750.00 \text{ Principal.} \\
 \hline
 \$825.00 \text{ Amount.}
 \end{array}$$

What is the interest on

2. \$375 for 4 yrs. 6 mos. @ 6% ?
3. \$450 for 7 yrs. 10 mos. @ 7% ?
4. \$3645 for 3 yrs. 8 mos. 10 days @ 9% ?
5. \$524.50 for 6 yrs. 3 mos. @ 6% ?
6. \$2746.25 for 10 yrs. 4 mos. @ 7% ?
7. \$1,820,000,000 (U. S. National Debt, 1881) for 12 yrs. @ 5% ?

**223. By aliquot parts.**

*Rule 2.*—Find the interest for the years as in Rule 1, and take aliquot parts for the months and days.

**EXAMPLE.**

1. What is the interest on \$240 for 1 yr. 7 mos. 10 days @ 5%?

$$\begin{array}{r}
 \$240 \\
 .05 \\
 \hline
 \$12.00 \text{ Int. for 1 year.} \\
 6.00 \text{ " " 6 mos.} \\
 1.00 \text{ " " 1 mo.} \\
 .33\frac{1}{3} \text{ " " 10 days.} \\
 \hline
 \$19.33\frac{1}{3} \text{ " " 1 yr. 7 mos. 10 days.}
 \end{array}$$

$6 \text{ mos.} = \frac{1}{2} \text{ of 1 yr.}$        $6.00$  " " 6 mos.  
 $1 \text{ mo.} = \frac{1}{6} \text{ of 6 mos.}$        $1.00$  " " 1 mo.  
 $10 \text{ ds.} = \frac{1}{3} \text{ of 1 mo.}$        $.33\frac{1}{3}$  " " 10 days.

2. What is the interest on \$2345.50 for 3 years, 7 months, 20 days, at 10%? *Ans.* \$853.50.

3. What is the interest and amount on \$764.20 for 4 years, 5 months, and 8 days, at 6%?

*Ans.* Int., \$203.53; Amount, \$967.73.

4. What is the interest on \$375.25 for 3 years, 8 months, 15 days, at 5%? *Ans.* \$69.58.

5. Find the interest and amount of \$625 for 2 years, 9 months, 21 days, at 6%.

**Six per cent. method.****224. The interest at 6 per cent. on ONE DOLLAR for**

$$\begin{array}{l}
 1 \text{ year, or } 12 \text{ mos.} = .06, \text{ or } 6 \text{ cents.} \\
 2 \text{ mos., or } 60 \text{ days} = .01, \text{ or } 1 \text{ cent.} \\
 1 \text{ mo., or } 30 \text{ days} = .005, \text{ or } \frac{1}{2} \text{ cent, or } 5 \text{ mills.} \\
 6 \text{ days} = 1 \text{ mill.} \\
 1 \text{ day} = \frac{1}{6} \text{ mill.}
 \end{array}$$

By the above it will be seen that *one-half* the number of *months* equals the interest on 1 dollar in *cents*, and *one-sixth* the number of *days* equals the interest on 1 dollar in *mills*.

As cents are reduced to dollars by dividing by 100, and mills by dividing by 1000, we have the following:—

**225. To compute interest at 6 per cent.**

If the time is in months or years.

*Rule.*—Multiply the principal by one-half the number of months, and point off two decimals. If there are cents in the principal, point off four decimals; the remaining figures will be the interest, in dollars.

If the time is in days.

*Rule I.*—Multiply the principal by one-sixth the number of days, and in the product point off three decimals. If there are cents in the principal, point off five; the remaining figures will be the interest, in dollars.

Or, to avoid multiplying by fractions:—

*Rule II.*—Multiply the principal by the number of days, and divide the product by 6; then point off as in the preceding rule. (See Principles of Multiplication and Division, Art. 23, page 25.)

**226.** When the time is less than 1 month, the cents in the principal may be disregarded; when less than 2 months, all under 50c.; when less than 3 months, all under 33c.

**EXAMPLES.**

1. What is the interest on \$1875 for 7 months?

$$\frac{1}{2} \text{ of } 7 = 3\frac{1}{2}. \quad 1875 \times 3\frac{1}{2} = 6562\frac{1}{2}. \quad \text{Ans. } \$65.62\frac{1}{2}.$$

2. What is the interest on \$240.50 for 10 mos.?

$$\frac{1}{2} \text{ of } 10 = 5. \quad 24050 \times 5 = 120250. \quad \text{Ans. } \$12.02\frac{1}{2}.$$

3. What is the interest on \$4250 for 24 days?

$$\frac{1}{6} \text{ of } 24 = 4. \quad 4250 \times 4 = 17000. \quad \text{Ans. } \$17.$$

4. What is the interest on \$520.75 for 42 days?

$$\frac{1}{6} \text{ of } 42 = 7. \quad 52075 \times 7 = 364525. \quad \text{Ans. } \$3.65.$$

5. What is the interest on \$4248 for 29 days?

By Rule I. :—

$$\frac{1}{6} \text{ of } 29 = 4\frac{5}{6}. \quad 4248 \times 4\frac{5}{6} = 20532. \quad \text{Ans. } \$20.53.$$

By Rule II. :—

$$4248 \times 29 = 123192. \quad 123192 \div 6 = 20532. \\ \text{Ans. } \$20.53.$$

6. What is the interest on \$480.25 for 4 mos. 3 days ?

$$\begin{array}{rcl}
 \text{Int. on } \$480.25 \text{ for } 4 \text{ mos.} & = & \$9.61 \\
 \text{“ “ “ } 3 \text{ days} & = & .24 \\
 \text{Ans.} & \underline{\hspace{1cm}} & \$9.85
 \end{array}$$

Or, 4 mos. 3 days = 123 days.

$$\frac{1}{6} \text{ of } 123 = 20\frac{1}{2}. \quad 480.25 \times 20\frac{1}{2} = 9845.12. \quad \text{Ans. } \$9.85.$$

7. What is the interest on \$893.56 for 10 months ? Ans. \$44.68.

What is the interest on

- |   |               |
|---|---------------|
| 8. \$1349.40 for 19 days ?              | Ans. \$4.27.  |
| 9. \$344 for 2 mos. 15 days ?           | Ans. \$4.30.  |
| 10. \$1026 for 48 days ?                | Ans. \$8.21.  |
| 11. \$300 for 236 days ?                | Ans. \$11.80. |
| 12. \$5650.37 for 27 days ?             |               |
| 13. \$7250.45 for 3 mos. 29 days ?      |               |
| 14. \$364.50 for 1 yr. 4 mos. 12 days ? |               |
| 15. \$1575.25 for 9 mos. 17 days ?      |               |

The notes, accounts-current, and interest accounts, in another part of the book, will afford additional examples for practice.

**227.** By Art. 23, page 25, we find that it will make no difference in the result whether the number of days, or the product, or the principal be divided by 6. Therefore when the principal can be conveniently divided, it may sometimes be easier to do so than to divide either the number of days or the product. Thus interest on \$120 for 27 days can be readily found by dividing \$120 by 6, and multiplying the quotient \$20 by 27 = \$540.

**228.** So also if the days are divided by 3, and the product or the principal by 2, the result will be the same as if the product only was divided by 6. In the example above,  $27 \div 3 = 9$ .  $120 \times 9 = 1080$ , which divided by 2 = 540, the same as before.

**229.** Multiplying *one-half* the principal by one-third the number of days will give the same result. One-half of 120 = 60.  $60 \times 9 = 540$ . The last three methods are in favor with some persons.

**230.** When there are months and days, one-third of the days can be annexed to the months for a multiplier, and then one-

half of either the principal, multiplier, or product can be taken. Three places are to be pointed off as when multiplying by the number of days.

231. When either the amount or the number of days has a cipher at the right, it is sometimes an advantage to divide by 10 and annex the cipher to the other number, which will not change the result.

## EXAMPLE.

What is the interest on \$330 for 44 days?

*This is the same as \$440 for 33 days.*

*By Art. 225, int. on \$440 for 60 days = \$4.40.*

*Then \$2.20 = int. for 30 days.*

“      22 = “      3 “

$\$2.42 =$  “      33 “

*By Art. 224,  $330 \times 7\frac{1}{3} = 2420$ .      Ans. \$2.42.*

## Six Per Cent. by Aliquot Parts of Sixty Days.

As six per cent. annually equals 1 per cent. for 2 months or 60 days, and as 1 per cent. of any number can readily be found simply by pointing off two places from the right, the interest for 60 days, or any aliquot parts of 60 days, can be found by the following

*Rule.*—For sixty days move the decimal point two places to the left.

*For days more or less than sixty, find the interest for sixty days, and add or subtract for the difference in time by adding or subtracting the aliquot parts, which the difference in time may be of sixty.*

## EXAMPLES.

1. What is the interest on a note for \$328.50 payable at 90 days?

$90 + 3 \text{ days' grace} = 93.$

Interest on \$328.50 for 60 days      = \$3.29

“      “      “      “ 30 “  $\frac{1}{2}$  of 60 = 1.64

“      “      “      “ 3 “  $\frac{1}{10}$  of 30 = .16

“      “      “      “ 93 “      = \$5.09

2. What is the interest on \$540 for 47 days ?

*Int. for 60 days = \$5.40*

*Int. for 10 days =  $\frac{1}{6}$  of 60 = .90*

*" " 3 " =  $\frac{1}{20}$  of 60 = .27 " " 13 " = 1.17*

*" " 47 " = \$4.23*

3. What is the interest on \$10,000 for 126 days ?

Required the interest on

4. \$4500 for 75 days.

9. \$837.50 for 43 days.

5. \$1256.50 for 48 days.

10. \$2750.42 for 51 days.

6. \$3625.40 for 63 days.

11. \$40,000 for 96 days.

7. \$782.50 for 33 days.

12. \$7489.20 for 78 days.

8. \$525.30 for 36 days.

13. \$687.36 for 153 days.

232. To compute interest for days at any given rate.

*Rule.*—Find the interest at six per cent., and divide it by 6, the quotient will be the interest at one per cent., then multiply this interest by the given rate. Or,

For 3 per cent., take  $\frac{1}{2}$  of 6%, or divide by 12 instead of 6.

"  $3\frac{1}{2}$  per cent., take  $\frac{1}{2}$  of 6% and add  $\frac{1}{4}$ .

" 4 per cent., subtract  $\frac{1}{3}$  of 6%, or divide by 9 instead of 6.

Or take 1% for every 90 days and aliquot parts.

"  $4\frac{1}{2}$  per cent., subtract  $\frac{1}{4}$  of 6%, or divide by 8 instead of 6.

Or take 1% for every 80 days and aliquot parts.

" 5 per cent., subtract  $\frac{1}{3}$  of 6%, or take 1% for every 72 days and aliquot parts.

" 7 per cent., add  $\frac{1}{3}$  of 6%, or to the principal or time, and then find at 6%.

" 8 per cent., add  $\frac{1}{4}$  of 6%, or take 1% for every 45 days and aliquot parts.

" 9 per cent., add  $\frac{1}{5}$  of 6%, or take 1% for every 40 days and aliquot parts.

" 10 per cent., take  $\frac{1}{6}$  of 6%, or 1% for every 36 days and aliquot parts.

" 12 per cent., divide the number of days, principal, or product by 3 instead of 6, or take 1% for every 30 days and aliquot parts.

## EXAMPLES.

1. What is the interest on \$500 for 72 days at 4%?

$$\frac{1}{9} \text{ of } 72 = 8. \quad 500 \times 8 = 4000. \quad \text{Ans. } \$4.$$

$$\text{Or, } 90 \text{ days} = 1\% = 5.00$$

$$18 \text{ " } = \frac{1}{5} \text{ of } 90 = 1.00$$

$$\text{Int. for 72 days } 4.00$$

2. What is the interest on \$600 for 93 days at
- $4\frac{1}{2}\%$
- ?

$$600 \times 93 = 55800 \div 8 = 6.975. \quad \text{Ans. } \$6.98.$$

$$\$6.00 \text{ Int. for } 80 \text{ days.}$$

$$.75 \text{ " " } 10 \text{ " } = \frac{1}{8} \text{ of } 80.$$

$$.15 \text{ " " } 2 \text{ " } = \frac{1}{5} \text{ of } 10.$$

$$.075 \text{ " " } 1 \text{ " } = \frac{1}{2} \text{ of } 2.$$

$$\underline{\$6.975} \text{ " " } \underline{93} \text{ " }$$

Find interest on the following, at the different rates, by the above rules:—

- |                                  |                               |
|----------------------------------|-------------------------------|
| 3. \$1285 for 33 days.           | 8. \$587.25 for 13 days.      |
| 4. \$4825.60 for 90 days.        | 9. \$1000 for 46 days.        |
| 5. \$2726.35 for 3 mos. 18 days. | 10. \$360 for 210 days.       |
| 6. \$1845.50 for 84 days.        | 11. \$500 for 87 days.        |
| 7. \$6750.30 for 136 days.       | 12. \$600 for 2 mos. 17 days. |

## ACCURATE INTEREST.

233. By the ordinary methods of computing interest at the rate of 360 days to the year, the interest is  $\frac{2}{385}$ , or  $\frac{1}{192.5}$  too much. As the interest by the ordinary method at 6 per cent. is \$1 per day for every \$6000, the difference in a year between the two methods is \$5.

The debt of the United States bearing interest is over eighteen hundred million dollars, and the difference, at  $4\frac{1}{2}\%$  per cent., between counting 360 and 365 days to the year, is more than \$3000 per day.

In the Treasury Department, at Washington, only accurate interest is computed.



**234. To compute accurate interest.**

*Rule.*—Find the interest as in the preceding rules, and subtract from it  $\frac{1}{72}$  part of itself; in leap-year subtract  $\frac{1}{144}$ .

*Note.*— $\frac{1}{72}$  equals a little less than  $1\frac{1}{2}$  cents for each dollar of interest.

Or, Multiply the interest on the given sum for 1 year by the number of days for which interest is required, and divide by 365. The quotient will be the required interest. This rule is equivalent to the following formula:—

$$\text{As } 365 \left. \vphantom{\begin{matrix} \text{The number of} \\ \text{days for which} \\ \text{int. is required} \end{matrix}} \right\} : \left\{ \begin{matrix} \text{The number of} \\ \text{days for which} \\ \text{int. is required} \end{matrix} \right\} :: \left\{ \begin{matrix} \text{The int. on the} \\ \text{given sum for} \\ \text{1 year.} \end{matrix} \right\} : \left\{ \begin{matrix} \text{The} \\ \text{required} \\ \text{int.} \end{matrix} \right\}$$

**EXAMPLES.**

1. What is the interest on U. S. bonds of \$15,000 from May 1st to July 17th, at 6%?

*From May 1st to July 17th = 77 days.*

*Int. on \$15000 for 1 year = \$900;  $900 \times 77 = 69300$ .*

*$69300 \div 365 = \$189.86$  Ans.*

2. What is the interest on a Four-per-cent. U. S. Bond of \$1000 from Nov. 1st to Jan. 21st? *Ans. \$8.88.*

3. What is the interest on a U. S. Bond of \$1000, bearing  $4\frac{1}{2}\%$  interest, from March 1st to Apr. 10th?

Find the accurate interest on

- |                                |  |
|--------------------------------|--|
| 4. \$2680 for 63 days @ 6%.    | 7. \$812.30 for 84 days @ $3\frac{1}{2}\%$ . |
| 5. \$574.50 for 36 days @ 5%.  | 8. \$5000 for 76 days @ $4\frac{1}{2}\%$ .   |
| 6. \$1250.60 for 57 days @ 4%. | 9. \$4500 for 49 days @ 4%.                  |

**INTEREST IN ENGLAND.**

**235.** The legal rate of interest in England is 5 per cent., and parts of a year are counted in days at the rate of 365 days to the year. To compute English interest:—

*Rule.*—Reduce the shillings and pence, if any, to the decimal or fraction of a pound (see Arts. 159 and 165, and page 103); then—

**For Years.**—Multiply the principal by the number of years, and the product will be the interest, in shillings.

**For Months.**—Multiply the principal by the number of months, and the product will be the interest, in pence.

**For Days.**—Multiply the principal by the number of days, divide the product by 73, and point off two decimals: the quotient will be the interest, in the denomination of the principal.

## EXAMPLES.

1. What is the interest on £425 for 1 year, 3 months, and 10 days, at 5%?

$$\begin{array}{r}
 425 \text{ s., interest for 1 year.} \\
 106.25 \text{ " " 3 months.} \\
 \underline{11.64 \text{ " " 10 days.}} \\
 542.89 \text{ s.} = \text{£}27 \text{ s. } 11 \text{ d. Ans.}
 \end{array}$$

## For any rate of interest.

**Rule.**—Reduce the shillings and pence in the principal, if any, to the decimals of a pound, and proceed as in computing interest on United States money. Reduce the decimals of a pound in the result, if any, to shillings and pence. (See Art. 157.)

2. What is the interest on £120 10s. 6d. for 3 yrs., at 4%?

$$\begin{array}{r}
 \text{£}120 \text{ } 10 \text{ s. } 6 \text{ d.} = \text{£}120.525 \\
 \qquad \qquad \qquad .04 \\
 \hline
 4.82100 \\
 \qquad \qquad \qquad 3 \text{ yrs.} \\
 \hline
 14.46300 \\
 \qquad \qquad \qquad 20 \\
 \hline
 9.26000 \\
 \qquad \qquad \qquad 12 \\
 \hline
 3.12000 \text{ Ans. } \text{£}14 \text{ } 9 \text{ s. } 3 \text{ d.}
 \end{array}$$

3. What is the interest on £540 8s. 3d. for 2 yrs. 6 mo. at 5%? At  $3\frac{1}{2}\%$ ? At 4%?

4. What is the interest at 5%, for 1 year, 3 mos., 15 days, on £617 15s.? On £425 10s.? On £1600?

# PROBLEMS IN INTEREST.

236. To find the **PRINCIPAL**, when the time, rate per cent., and interest are given.

*Rule.*—Divide the given interest by the interest on ONE DOLLAR for the given rate and time.

## EXAMPLES.

1. What sum invested at 6% for one year will produce \$360?

*Interest on \$1, for 1 year, at 6% = .06.*

*.06) 360.00 = 6000.      Ans. \$6000.*

2. What principal in 2 years at 7% will give \$3556?
3. What principal in 3 years 6 mos. at 6% will give \$470?
4. What must I pay for real estate, producing \$750 per year, that I may receive 6% on my investment?
5. What must I pay for stocks, paying a dividend of \$345 yearly, that I may gain 9%?
6. What reduction must I obtain that I may purchase stocks of the par value of \$8000, paying 6% dividend yearly, to receive 8% on what I invest?

237. To find the **RATE** per cent., when the principal, time, and interest are given.

*Rule.*—Divide the given interest by the interest on the principal at ONE per cent.

## EXAMPLES.

1. A house which costs \$4800 rents, above expenses, for \$264 per year. What per cent. does it pay on the investment?

*Interest on 4800 at 1% = 48.*

*264 ÷ 48 = 5½.      Ans. 5½%.*

2. If I invest \$3500 for 1 year 2 months, and receive \$490, what rate do I receive per year? *Ans. 12%.*
3. At what rate will \$1200 gain \$360 in 6 yrs.? In 9 yrs.? In 4 yrs.? In 3 yrs.?
4. Paid \$423.36 for the use of \$960 6 yrs. 3 mos. 18 days. What rate did I pay?

238. To find the **TIME**, when the principal, rate, and interest are given.

*Rule.*—Divide the given interest by the interest on the principal for ONE DAY; the quotient will be the required time, in days.

**EXAMPLES.**

1. In what time will \$5530.42 produce \$30.42 interest at 6%?

*Interest on \$5530.42 for 1 day = .921 +*

*.921) 30.42 (33 +*

*2763*

*2790*

*2763*

*Ans. 33 days.*

2. How long will it take a sum of money to double itself at 6% simple interest? At 7%? At 8%? At 4%?

3. Invested \$6000 at 6%, for which I received \$750.00. How long was it invested?

239. To find the **PRINCIPAL**, when the time, rate per cent., and amount are given.

*Rule.*—Divide the given amount by the amount of ONE DOLLAR for the given rate and time.

**EXAMPLES.**

1. What principal will amount to \$1120 in 2 years, at 6%?

*Amount of \$1 for 2 years at 6% = \$1.12.*

*1120 ÷ 1.12 = 1000.      Ans. \$1000.*

2. What principal will amount to \$1500 in 1 year, 3 mos., at 5%? At 7%? At 4%? At 4½%?

**TRUE DISCOUNT.**

240. **Discount**, as usually calculated, is the same as Simple Interest; but *true discount* is a deduction from an amount which is equal to the interest on the remainder at the same rate and for the same time for which the deduction was made.

**241. The Present Worth** is the sum paid, or the value of the note, or debt, after the discount has been deducted.

**242. To find the present worth.**

*Rule.*—Divide the given sum by the amount of ONE DOLLAR for the given rate and time.

To find the discount, subtract the present worth from the given sum.

#### EXAMPLES.

1. What is the present worth of \$1360, due 6 years hence, @ 6%?

*Int. on \$ 1 for 6 years = .36*

*1.00*

*Amount, 1.36) 1360.00 (1000*

*Ans. \$ 1000.*

2. What is the present worth of \$1248, due 8 months hence, @ 6%? What is the true discount?

3. What is the present worth of \$162.50, due 6 months hence, @ 7%, and what the discount?

#### BANKING.

**243. Bank Discount** is computed in the same manner as simple interest. It is deducted from the amount or face of the note when the note is discounted, and the remainder, called the proceeds, is placed to the credit of the person for whom the note is discounted. As the person offering the note can obtain the money immediately, and the note may remain unpaid until three o'clock on the day of its maturity, banks, generally, in reckoning time, include the day on which the note is discounted, as well as the day on which it matures. This, with the *three days of grace*, for which discount is also taken, makes *four* more days than the time mentioned in the note.

See, also, *Transactions with Banks.*

**244. To compute bank discount.**

*Rule.*—Multiply the amount by  $\frac{1}{6}$  the number of days, including the day of discount and the three days of grace, and in the product point off three decimals.

The above will give the interest at 6%. For any other rate, add or subtract in proportion as the given rate is greater or less than 6%, as in Art. 227.

## EXAMPLES.

1. Robert F. Hay, on May 2, offered the following note, properly indorsed, for discount :

\$525.

*Philadelphia, March 29, 1882.*

*Sixty days after date, we promise to pay to Robert F. Hay, or order, at the Union National Bank, Five Hundred and Twenty-Five Dollars, without defalcation. Value received.*

*R. J. Birney & Co.*

How much will he receive as the net proceeds of the note ?

60 days from March 29th is May 28th, which, with the three days of grace added, gives May 31st. From May 2d to May 31st, including the day of discount, is 30 days.

*Interest on \$ 525 for 30 days = 2.63 discount.*

*525 — 2.63 = 522.37 net proceeds.*

*Face of the note, \$ 525.00.*

2. On Nov. 4th, offered for discount a note for \$350, dated Oct. 15th, payable 3 months after date. How much cash will I receive ?

Find the time, discount, and proceeds of the following notes .

3. Discounted Nov. 4th, at 6% .

\$750.

*Pittsburgh, Oct. 15, 1882.*

*Three months after date, I promise to pay to the order of Jas. Dunlap & Co., Seven Hundred and Fifty Dollars, at the Citizens' National Bank, without defalcation. Value received.*

*John F. Chase.*

4. Discounted Jan. 12th, at 7% .

\$1250.<sup>75</sup>/<sub>100</sub>

*New York, Dec. 10, 1882.*

*Sixty days after date, I promise to pay to S. H. Crittenden & Co., or order, Twelve Hundred and Fifty <sup>75</sup>/<sub>100</sub> Dollars, for value received.*

*Henry T. Stewart.*

5. Discounted July 6th, at 6% .

\$450.<sup>60</sup>/<sub>100</sub>

*Trenton, N. J., May 10, 1882.*

*Four months after date, I promise to pay at the First National Bank, to the order of Samuel T. Brown, Four Hundred and Fifty <sup>60</sup>/<sub>100</sub> Dollars, without defalcation or discount.*

*Hayward, Gleason & Co.*

6. Discounted Sept. 18th, at 6%.

\$1875.

Chicago, Aug. 15, 1882.

*Ninety days after date, we promise to pay to the order of Charles Manning & Co. Eighteen Hundred and Seventy-Five Dollars, for value received.*

H. Evans & Co.

**245. To find how large a draft, at a given premium, may be purchased for a certain amount.**

*Rule.*—Divide the given amount by \$1, increased by the rate of premium.

*Note.*—To find how large a draft may be purchased, when sold at a discount, divide the given amount by \$1, less the rate of premium.

#### EXAMPLES.

1. How large a draft may be purchased for \$2020, at a premium of 1%?

$1.01)2020(2000.$       *Ans.* \$2000.

2. What is the face of a draft on New York to cost \$18500, at  $1\frac{1}{2}\%$  premium?

3. For what amount may a draft on Cuba be purchased with \$6430.77, at a premium of  $4\frac{1}{2}\%$ ?

4. A commission merchant wishes to invest the proceeds of a sale, amounting to \$4840, in a draft on St. Louis, which can be purchased at a discount of  $\frac{3}{4}\%$ . How large a draft can he obtain?

**246. To find the amount of a note that shall produce a given sum when discounted at bank.**

*Rule.*—Divide the given sum by the proceeds of \$1 for the given rate and time.

#### EXAMPLES.

1. For what sum must a note be drawn so that the discount for 63 days, at 6%, may be deducted and the proceeds will be \$1295?

*Interest on \$1 for 63 days = .0105.*

\$1.0000

.0105

            
 .9895)1295(1308.74 *Ans.*

2. Required the amount of a note that may be discounted for 33 days, at 6%, and \$5500 received as the proceeds.

3. How large must a note be made to obtain \$425.50 from a bank, for 42 days; discount @ 6%?

### MISCELLANEOUS EXAMPLES.

1. If a man renews his note for \$625 by giving a new note at 60 days, what will be the face of the new note, interest for the time and 3 days of grace included?

2. A merchant wishes to pay for goods by giving two notes, one at 90 days for \$450, and the other at 4 mos. for \$600. What will be the face of each note, interest included?

3. J. L. Gray bought goods for \$740 cash, and sold them for \$875, receiving a note at 90 days. The note he had discounted at bank at 6 per cent. How much were his profits after the discount was deducted?

4. What is the face of a note at 3 mos. for which, if discounted at bank at 6 per cent., the owner will receive \$1260?

247. Banks, by deducting the interest in advance, obtain a larger rate per cent. than they would by taking true discount; and this rate increases in proportion to the time for which the discount is taken. The advantages of short credits, however, are generally considered to be more than an equivalent for any such excess that might be gained by extending the time.

The following table shows the rates of interest obtained by banks, including the advantage from compounding the interest, when they discount notes at 6 and at 7 per cent., for any number of months from one to twelve. It will be seen that when the time is less than two months the excess is inconsiderable.

| RATE.           | 1 mo. | 2 mos. | 3 mos. | 4 mos. | 5 mos. | 6 mos. | 7 mos. | 8 mos. | 9 mos. | 10 mos. | 11 mos. | 12 mos. |
|-----------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|
| 6 per cent..... | 6.200 | 6.216  | 6.232  | 6.248  | 6.264  | 6.281  | 6.298  | 6.315  | 6.332  | 6.349   | 6.366   | 6.383   |
| 7 " " .....     | 7.272 | 7.295  | 7.317  | 7.339  | 7.362  | 7.385  | 7.408  | 7.432  | 7.456  | 7.480   | 7.503   | 7.527   |

At the nominal rate of 6 per cent., a bank receives, when it discounts a note for 1 month,  $\frac{5}{100}$ , or  $.5\frac{25}{100}$  of 1 per cent. ( $\frac{25}{100}$  of 1 per cent. more than 6 per cent. per annum =  $\frac{1}{4}$  of ONE CENT on \$99.50); when for 2 months,  $\frac{1}{100}$ , or  $1\frac{1}{100}$  per cent.; when for 1 year,  $\frac{6}{100}$ , or  $6\frac{1}{100}$  per cent.



## INTEREST ACCOUNTS.

**248.** In the settlement of mercantile accounts, interest is calculated or not, according to custom or the agreement of the parties.

What is termed the **CASH BALANCE** is the sum that will be required to settle an account at any specified date. It is found by taking the difference between the two sides of an account. If either side bears interest, that must first be ascertained; and if any amount is not yet due, discount must be allowed; either by deducting it from the amount, or adding it to the other side of the account.

**249.** Bankers, Saving Funds, etc., charge and allow interest on dealers' accounts according to regulations, which vary in different places.

Amounts are considered due at the time they should be paid in cash, or when they are equivalent to cash. After the time is adjusted, interest is generally calculated by one of the following methods :—

**First Method.**

**By Interest on each amount to the time of settlement.**

**Second Method.**

**By Product of Days.**

**Third Method.**

**By Daily Balances.**

**250.** By the **First Method**, interest is reckoned on each amount from the day it is due to the day of settlement, and the balance between the debit and credit interest is added to that side of the account on which the amount of interest is the largest.

When an amount is not due until after the day of settlement, a discount is allowed, and entered on the opposite side of the account in the interest column.

The labor of making out such accounts is much lessened by the use of Interest Tables.

**251. By the Second Method,** each amount is multiplied by the number of days from the time it is due to the day of settlement. The interest on the sum of the products for *one day* equals the sum of the interest on each amount taken separately. The interest on the balance of products for one day equals the balance of interest.

When an amount is not due until after the day of settlement, it is multiplied by the number of days from the day of settlement to the day when it becomes due, and the product is placed in the column of products on the opposite side, in the same manner as discount is treated in the first method.

This method saves the labor of dividing the several products, and is considered more nearly accurate than the first, because there are no fractions lost on the several amounts. It is used extensively by foreign merchants who have dealings with this country.

**252. By the Third Method,** the balance existing at any time is multiplied by the number of days it remains unchanged. The interest on the product for *one day* equals the interest on the balance for the number of days it continues; and the interest on the difference between the total daily balances for one day equals the balance of interest between the debit and credit sides of the account, calculated on each amount separately, as by the first method.

When the rate of interest on one side of the account is different from the rate on the other, the interest is calculated on the total daily products of each side separately for one day, and the balance of interest is taken. If the rate of interest on both sides of the account is the same, the difference between the footings of the debit and credit sides of the total daily balances may be taken first, and the interest reckoned on that for one day.

This method is used by many bankers. Besides saving much labor, the total daily balances may be entered without delaying for any particular day, and can therefore be kept in readiness, and the account completed with very little additional trouble, whenever the day of settlement is determined.

For practice, all the accounts given may be made out in each of the different methods, and may also be averaged by Average of Accounts with the same results as above.

## INTEREST ACCOUNTS.

## FIRST METHOD.—By Interest on each Amount to the Time of Settlement.

JOHN C. BENNETT &amp; Co. in Account Current and Interest Account with GEORGE D. PATTEN &amp; Co. to

January 1, 1882.

| Date.            | When due.        |  | Amt.    | Days. | Int.  | Date.            | When due.         |  | Amt.    | Days. | Int.  |
|------------------|------------------|--|---------|-------|-------|------------------|-------------------|--|---------|-------|-------|
| 1881.<br>July 31 | 1881.<br>Oct. 31 | To Mdse. at 3 mos., as per bill rendered, . . .                  | 1200 00 | 62    | 12 40 | 1881.<br>July 31 | 1881.<br>Sept. 29 | By Invoice of Coffee, at 60 days, shipped per Str. "Wm. P. Clyde," . .       | 1575 00 | 94    | 24 68 |
| Aug. 5           | Nov. 5           | " Mdse. at 3 mos., as per bill rendered, . . .                   | 1542 00 | 57    | 14 65 | Oct. 15          | Nov. 12           | " Net Proceeds of sales of Sugar and Rice, as per Acct Sales rendered, . . . | 1256 00 | 50    | 10 47 |
| Sept. 10         | Sept. 10         | " Mdse. (Net), as per bill rendered, . . .                       | 760 00  | 113   | 14 13 | " 23             | " 25              | " Draft on P. R. Brown & Co. at 80 days, . .                                 | 1000 00 | 37    | 6 17  |
| Oct. 15          | Feb. 15          | " Net Proceeds of sales of Flour, as per your Account Sales, . . | 1880 00 |       |       | Nov. 30          | 1882.<br>Mar. 3   | " Note of H. Y. King & Co. at 3 months, your favor, . . .                    | 500 00  | 45    | 13 73 |
| Nov. 20          | Nov. 20          | " Cash paid your draft on us at sight, favor J. Grant & Co., . . | 640 00  | 42    | 4 48  | 1882.<br>Jan. 1  |                   | " Discount on \$1850, per contra, . . .                                      |         |       |       |
| 1882.<br>Jan. 1  |                  | <i>Credit Bal. of Interest,</i>                                  | 3862 00 | 61    | 5 08  |                  |                   |  |         |       |       |
|                  |                  |  |         |       | 4 51  |                  |                   |  |         |       |       |
|                  |                  |  |         |       | 55 05 | Jan. 1           |                   | Add Bal. of Interest, . .  | 4331 00 |       | 55 05 |
|                  |                  |  |         |       |       |                  |                   | <i>Bal. carried down, . .</i>  | 1626 69 |       |       |
| 1882.<br>Jan. 1  |                  | To Balance due, . . .  | 1626 69 |       | 55 05 |                  |                   |  | 5962 00 |       | 55 05 |
|                  |                  | NEW YORK, Jan. 1, 1882.  |         |       |       |                  |                   | E. E.<br>GEO. D. PATTEN & Co.  |         |       |       |



**THIRD METHOD.—By Daily Balances.**

THE WESTERN SAVING FUND

*In account with* HENRY J. RODGERS.

*Interest to Feb. 28, 1882.*

| 1882. |    |                         |        | 1882. |    |                                    |        |
|-------|----|-------------------------|--------|-------|----|------------------------------------|--------|
| Jan.  | 2  | To Cash,                | 100 00 | Jan.  | 7  | By Check,                          | 50 00  |
| "     | 12 | " "                     | 250 00 | "     | 22 | " "                                | 100 00 |
| Feb.  | 11 | " "                     | 80 00  | Feb.  | 1  | " "                                | 40 00  |
| "     | 21 | " "                     | 200 00 | "     | 21 | " "                                | 50 00  |
| "     | 28 | " Int. to Feb. 28, '82, | 1 62   | "     | 28 | " Cash on settle-<br>ment of acct. | 341 62 |
|       |    |                         | 581 62 |       |    |                                    | 581 62 |

Balances.

Time.

|      |                        |          |                |
|------|------------------------|----------|----------------|
| 100, | from Jan. 2 to Jan. 7, | 5 days = | 500 for 1 day. |
| 50,  | " " 7 " " 12,          | 5 " =    | 250 " "        |
| 300, | " " 12 " " 22,         | 10 " =   | 3000 " "       |
| 200, | " " 22 " Feb. 1,       | 10 " =   | 2000 " "       |
| 160, | " Feb. 1 " " 11,       | 10 " =   | 1600 " "       |
| 190, | " " 11 " " 21,         | 10 " =   | 1900 " "       |
| 340, | " " 21 " " 28,         | 7 " =    | 2380 " "       |

11630

Total daily balance = \$11630 for 1 day.

Which, at 5% interest = \$1.62.

3. What is the balance due on March 1st of the following account at 6% :—

THE NATIONAL SAVING INSTITUTION

*In account with* PORTER A. FLORENCE.

|       |    |         | Dr. Amts. | Cr. Amts. | Days. | Daily Balance. |
|-------|----|---------|-----------|-----------|-------|----------------|
| 1882. |    |         |           |           |       |                |
| Jan.  | 2  | To Cash | 300 00    |           |       |                |
| "     | 17 | By "    |           | 100 00    |       |                |
| "     | 27 | To "    | 250 00    |           |       |                |
| "     | "  | By "    |           | 150 00    |       |                |
| Feb.  | 6  | " "     |           | 250 00    |       |                |
| "     | 7  | To "    | 250 00    |           |       |                |

## INTEREST ACCOUNTS.

GEORGE M. GRANT *In acct. with* BROWNSON & Co., to July 1st, 1882.

| Days.        | Dr.     | Cr.     | Daily Balance. |         |  | Days. | Total Daily Balance. |            |    |
|--------------|---------|---------|----------------|---------|--|-------|----------------------|------------|----|
| 1882.        |         |         |                |         |  |       |                      |            |    |
| Jan. 7       |         | 1000 00 |                | 1000 00 |  | 10    |                      | 10000 00   | 00 |
| " 17         |         | 250 00  |                | 1250 00 |  | 7     |                      | 8750 00    | 00 |
| " 24         |         |         | 250 00         |         |  | 7     | 1750 00              |            |    |
| " 31         | 1500 00 | 500 00  |                | 250 00  |  | 6     |                      | 1500 00    | 00 |
| Feb. 6       | 1000 00 |         | 750 00         |         |  | 10    | 7500 00              |            |    |
| " 16         |         | 850 00  |                | 100 00  |  | 24    |                      | 2400 00    | 00 |
| Mar. 12      | 1250 00 |         | 1150 00        |         |  | 30    | 34500 00             |            |    |
| Apr. 11      |         | 1000 00 | 150 00         |         |  | 65    | 19750 00             |            |    |
| June 15      |         | 3000 00 |                | 2350 00 |  | 16    |                      | 45600 00   | 00 |
| Bal. Int. to | 3750 00 | 6800 00 |                |         |  |       | 53500 00             |            |    |
| July 1st,    |         | 2 46    |                |         |  |       |                      | 68250 00   | 00 |
|              |         |         |                |         |  |       |                      | 53500 00   | 00 |
| Bal. of %,   | 3750 00 | 6802 46 |                |         |  |       |                      | 6)14750 00 | 00 |
|              | 2352 46 |         |                |         |  |       |                      | 2.458 33   |    |
| Bal. of %,   | 6602 46 | 6602 46 |                |         |  |       |                      |            |    |
|              |         | 2852 46 |                |         |  |       |                      |            |    |

Credit Bal. of Int.

BROWNSON & Co.

CINCINNATI, July 1st, 1882.

## PARTIAL PAYMENTS.

**253.** **Partial Payments** are payments made at different times of part of a Note, Bond, or other obligation, and should be indorsed upon the back of it.

**254.** When a partial payment is made *before the debt is due*, it cannot be apportioned part to the debt and part to the interest; but interest is allowed on the payment as well as on the principal to the time the debt becomes due.

**255.** Interest is not allowed to form part of the principal, so as to carry interest.

**256.** The following rule for computing interest when partial payments have been made has been adopted by the Supreme Court of the United States, and by New York, Massachusetts, and most of the other States of the Union, and is called

## THE UNITED STATES RULE.

*I. The rule for casting interest when partial payments have been made, is to apply the payment, in the first place, to the discharge of the interest due.*

*II. If the payment exceeds the interest, the surplus goes towards discharging the principal, and the subsequent interest is to be computed on the balance of principal remaining due.*

*III. If the payment be less than the interest, the surplus of interest must not be taken to augment the principal; but interest continues on the former principal until the period when the payments, taken together, exceed the interest due, and then the surplus is to be applied towards discharging the principal, and interest is to be computed on the balance as aforesaid.*

Decision of Chancellor KENT, *Johnson's Chancery Rep.*, vol. i., p. 17.

Or,

**257.** *Apply whatever payments may be made to the discharge of the interest then due, and the surplus, if any, to the discharge of the principal.*

**Note.**—The principal remains unaltered when the payment is less than the interest at the time due.

**258.** It will be perceived that, by the above rule, if a person owing the debt makes a payment not greater than the

interest, he loses the use of it until the time when the sum of the payments exceeds the interest.

For instance, the interest on \$1000 is \$5 per month. If \$5 per month is paid, at the end of the year \$1000 would still be due, while the interest on the payments, \$1.65, would be lost.

**259.** The Connecticut rule differs from the United States rule only in this respect, that if a payment greater than the interest at the time due be made before the principal has been on interest one year, the person making it is allowed interest on it to the end of the year. If settlement be made within one year, interest is allowed on the payments from the time they are made to the time of settlement.

#### EXAMPLES.

1. A bond was given for \$1500, dated July 1st, 1879, payable 1 year after date, with interest. The following indorsements appear on the bond :—

July 1st, 1880, Received Fifty Dollars.

Jan. 1st, 1882, “ One Thousand Dollars.

How much was due at the time of settlement, July 1st, 1882 ?

|  |       |            |
|--|-------|------------|
| Original sum named in the bond,                      |       | \$ 1500.00 |
| Interest from July 1st, 1879, to July 1st, 1880,     | \$ 90 |            |
| First payment, a sum less than interest,             | 50    |            |
|  | 40    |            |
| Interest from July 1st, 1880, to Jan. 1st, 1882,     | 135   |            |
|  | 175   |            |
| Second payment, a sum greater than interest,         | 1000  | 825.00     |
| Balance for new principal,                           |       | 675.00     |
| Interest from Jan. 1st, 1882, to July 1st, 1882,     |       | 20.25      |
| Amount of principal and interest due July 1st, 1882, |       | \$ 695.25  |

2. \$3500.

*New York, Aug. 17, 1881.*

*For value received, I promise to pay to Henry L. Barnes, or order, on demand, Three Thousand Five Hundred Dollars, with interest.*

*Robt. H. Wilson.*

Indorsements. March 17th, 1882, One Hundred Dollars. July 17th, 1882, Fifty Dollars. Nov. 17th, 1882, Three Hundred Dollars. Feb. 17th, 1883, Fifteen Hundred Dollars.

How much remains due August 17th, 1883 ?



**260.** As it is customary among merchants to settle their accounts yearly, or oftener, the following rule is much used by them, and is called

### THE MERCHANTS' RULE.

*I. First find the interest on the principal from the time it becomes due to the time of settlement, and add it to the principal.*

*II. Find the interest on each payment from the time it was made to the time of settlement, and add the sum of the interest thus found to the sum of the payments.*

*III. Deduct the sum of the payments and interest thereon from the amount of principal and interest, and the difference will be the balance due.*

**Note.**—This is substantially the same as the First Method for finding interest on Accounts Current. (See Art. 245 and page 141.)

### EXAMPLES.

1. \$600. *Philadelphia, June 12, 1881.*  
*For value received, on demand, I promise to pay to the order of Andrew W. Dawson, Six Hundred Dollars, with interest, without defalcation.*  
*Chas. C. Runyon.*

Indorsements.

August 12th, 1881, Received One Hundred Dollars.

November 12th, 1881, " Two Hundred and Fifty Dollars.

January 12th, 1882, " One Hundred and Twenty Dollars.

How much was due February 12th, 1882?

|  |          |          |
|--|----------|----------|
| Principal,   |          | \$600.00 |
| Int. from June 12th, 1881, to Feb. 12th, 1882, 8 mos., |          | 24.00    |
| Amount of note to February 12th, 1882,                 |          | 624.00   |
| First payment, Aug. 12th, 1881,                        | \$100.00 |          |
| Interest 6 months,                                     | 3.00     |          |
| Second payment, Nov. 12th, 1881,                       | 250.00   |          |
| Interest 3 months,                                     | 3.75     |          |
| Third payment, Jan. 12th, 1882,                        | 120.00   |          |
| Interest 1 month,                                      | .60      |          |
| Amount of payments and interest,                       | 477.35   | 477.35   |
| Balance due February 12th, 1882,                       |          | \$146.65 |

2. \$350.

Cleveland, May 9, 1881.

*Six months after date, I promise to pay to the order of James Brown & Co., Three Hundred and Fifty Dollars, value received.*

Edward S. Long.

Indorsements.

July 12th, 1882, Received Seventy-Five Dollars.

Oct. 27th, 1882, " Two Hundred Dollars.

How much was due Jan. 3d, 1883 ?

## TABLE

Showing in how many Years a given Principal will  
Double itself.

| RATE. | AT SIMPLE<br>INTEREST. | AT COMPOUND INTEREST. |                            |                          |
|-------|------------------------|-----------------------|----------------------------|--------------------------|
|       |                        | Compounded<br>Yearly. | Compounded<br>Half-Yearly. | Compounded<br>Quarterly. |
| 1     | 100.                   | 69.666                | 69.487                     | 69.400                   |
| 1½    | 66.66                  | 46.556                | 46.382                     | 46.298                   |
| 2     | 50.00                  | 35.004                | 34.830                     | 34.743                   |
| 2½    | 40.00                  | 28.071                | 27.899                     | 27.812                   |
| 3     | 33.33                  | 23.450                | 23.278                     | 23.191                   |
| 3½    | 28.57                  | 20.150                | 19.977                     | 19.890                   |
| 4     | 25.00                  | 17.673                | 17.502                     | 17.415                   |
| 4½    | 22.22                  | 15.748                | 15.576                     | 15.490                   |
| 5     | 20.00                  | 14.207                | 14.036                     | 13.946                   |
| 5½    | 18.18                  | 12.946                | 12.775                     | 12.686                   |
| 6     | 16.67                  | 11.896                | 11.725                     | 11.639                   |
| 6½    | 15.38                  | 11.007                | 10.836                     | 10.750                   |
| 7     | 14.29                  | 10.245                | 10.075                     | 9.989                    |
| 7½    | 13.33                  | 9.585                 | 9.914                      | 9.828                    |
| 8     | 12.50                  | 9.006                 | 8.837                      | 8.751                    |
| 8½    | 11.76                  | 8.497                 | 8.346                      | 8.241                    |
| 9     | 11.11                  | 8.043                 | 7.874                      | 7.788                    |
| 9½    | 10.52                  | 7.638                 | 7.468                      | 7.383                    |
| 10    | 10.00                  | 7.273                 | 7. +                       | 7. +                     |

## AVERAGE OF PAYMENTS.

**256.** The average of several numbers is that number each would be if their sum was divided equally. Thus, the average number of yards in four pieces of cloth, one containing 24 yards, one 36 yards, one 38 yards, and one 42 yards, is 35 yards. The total number of yards equals 140, which, divided by the number of pieces, equals 35,—the average number of yards in each piece.

**257. Average or Equation of Payments** is the method of finding the time when the payment of several sums, due at different times, may be made at once, without loss of interest to either debtor or creditor.

**258.** Accounts are settled both by the methods given in Interest Accounts and by averaging. When several bills of goods are sold on credit, and become due on different dates, instead of settling each bill separately as it becomes due, it is customary to average the time, and settle the amount of all the bills at the averaged time. This saves the labor of computing interest on the several bills.

**259.** When all the amounts are alike, the average time is found by adding the different terms of credit together and dividing their sum by the *number* of the amounts. This, however, is seldom the case, and other rules have been found necessary.

**The Focal Date** is the date from which the time is counted to the dates when the several amounts become due.

For finding the time between two dates, see pages 122 and 123, and the **TIME TABLE**, page 165.

The following rules are those most in use :

**260.** To find the average time when all the terms of credit begin at the same time.

*Rule.*—Multiply each amount by its term of credit, and divide the sum of the several products by the sum of the debts; the quotient will be the average term of credit.

## EXAMPLE.

1. A merchant purchases goods, January 6th, amounting to \$900: \$300 payable in 6 months, \$300 in 8 months, \$300 in 10 months. When may the whole be paid without loss to either party?

$$\begin{array}{rcl}
 \$300 \text{ for } 6 \text{ months} & = & 1800 \text{ for } 1 \text{ month,} \\
 300 \text{ " } 8 \text{ " } & = & 2400 \text{ " " } \\
 300 \text{ " } 10 \text{ " } & = & 3000 \text{ " " } \\
 \hline
 900 & ) & 7200 \text{ " " } \text{ Ans. } 8 \text{ months.}
 \end{array}$$

\$900 at the different terms of credit equals \$7200 for 1 month, or as many months as \$900 is contained times in \$7200, which is 8 times. Therefore, if the merchant gives one note payable 8 months after January 6th, it will be equivalent to giving three notes payable according to the terms of credit first proposed.

## PROOF.

$$\begin{array}{rcl}
 \text{Interest on } \$300 \text{ for } 6 \text{ months} & = & \$9 \\
 \text{" " } 300 \text{ " } 8 \text{ " } & = & 12 \\
 \text{" " } 300 \text{ " } 10 \text{ " } & = & 15 \\
 \hline
 \text{" " } \$900 \text{ " } 8 \text{ " } & = & \$36
 \end{array}$$

In averaging payments, any date may be taken to count from without varying the result, provided the average time found be counted from the same date to obtain the time of payment. Thus, the first day of January may be taken, as is done in some equation tables; or some date in the future may be selected, and the time counted back from that to each of the dates; the average date of payment will be the same in both cases.

It is evident, however, that the greater the distance of the day selected from the different dates when the amounts are due, the larger will be the multiplier, and, consequently, the more the labor of averaging. If we find the dates when the several amounts are due, and assume the earliest, or the latest, as the focal date, the numbers to be used as multipliers will be the smallest that can be found. It should be remembered that the average date to be found is not the average of the times of sale, or of the terms of credit, but of the dates when due.

After the dates when the different amounts are due have been ascertained, the time from the earliest date to each of the other dates may be taken as the terms of credit to which the amounts are entitled.

**261.** To find the average time when the terms of the credits begin at different times.

*Rule I.*—Find the date when each debt becomes DUE. (See Time Tables.)

Find the time intervening between the earliest of these dates and the date of each succeeding amount.

Multiply each amount by the time intervening between the earliest date and the date when the amount becomes due.

Divide the sum of the products by the sum of the debts; the quotient will be the average time required.

Add this average time to the focal date for the day of payment.

**Note 1.**—The amount first due will have no multiplier, and consequently no product; but it must be included in the sum of the debts, which is used as a divisor.

**Note 2.**—When a purchase is made for cash, it is due on the day of the purchase.

**Note 3.**—When the term of credit is the same for each amount, labor may be saved by averaging the dates of purchase, and adding the term of credit to the average date so found.

**Note 4.**—If the result contains a fraction less than one-half a day, reject it; if it is more, add one to the number of days. Also, when the cents are less than 50, disregard them; when more, call them \$1.

#### EXAMPLES.

1. Required the time when the amount of the debts as below stated become due per average.

| Date of Purchase. | Amount. | Time of Credit. | When due. | Time from          |
|-------------------|---------|-----------------|-----------|--------------------|
| Jan. 6,           | \$ 300  | 6 mos.          | July 6.   | July 6 to Aug. 7,  |
| Apr. 10,          | 200     | 6 "             | Oct. 10.  | 32 days.           |
| May 7,            | 400     | 3 "             | Aug. 7.   | July 6 to Oct. 10, |
|                   |         |                 |           | 96 days.           |

## STATEMENT ARRANGED.

|                        | Due. | Time (in days). | Amount.    | Product.            |
|------------------------|------|-----------------|------------|---------------------|
| From July 6 to July 6, |      | 0               | 300        | 00000               |
| " " " Aug. 7,          |      | 32 ×            | 400        | 12800               |
| " " " Oct. 10,         |      | 96 ×            | 200        | 19200               |
|                        |      |                 | <u>900</u> | <u>32000</u>        |
|                        |      |                 |            | (35 $\frac{2}{3}$ ) |

Ans. 36 days from July 6th is August 11th.

## 2. Average the following statement of account:

|                            |           |
|----------------------------|-----------|
| Mar. 6, To Mdse. @ 30 days | \$315.00. |
| " 18, " " " 60 "           | 420.00.   |
| " 25, " " " 3 mos.         | 612.50.   |
| Apr. 4, " " " 60 days      | 210.25.   |
| " 12, " " " 30 "           | 400.00.   |

3. The following items were sold on a credit of 30 days each. What is the average time for the payment of the whole amount? (See Note 3, Art. 261.)

|                                 |           |
|---------------------------------|-----------|
| Apr. 1, 20 bbls. Ex. Fam. Flour | @ \$8.50. |
| " 11, 500 bus. Ohio Wheat       | " 1.25.   |
| " 21, 30 bbls. Western Flour    | " 6.75.   |
| " 26, 100 bus. Oats             | " .45.    |

## 4. Find the average of the following:

|                         |                  |
|-------------------------|------------------|
| June 3, Mdse. @ 3 mos., | \$1275.00        |
| " 15, " " 60 days,      | 500.00           |
| July 12, " " 3 mos.,    | 450.50           |
| Aug. 18, " " 90 days,   | 320.87           |
| Sept. 25, " " 3 mos.,   | 145.63           |
|                         | <u>\$2692.00</u> |

|                            |                  |
|----------------------------|------------------|
| 5. May 5, Mdse. @ 60 days, | \$600.00         |
| " 16, " " 30 "             | 396.40           |
| June 10, Cash,             | 250.00           |
| July 7, Mdse. (net),       | 420.00           |
| Aug. 14, " @ 60 days,      | 538.28           |
|                            | <u>\$2204.68</u> |

## Abbreviated Method.

262. The cents and the units of dollars may be disregarded, in averaging, without any important change in the result.

## EXAMPLE.

| Due.    | Amount.  | Time. | Amount,<br>omitting dolls. and cents. |     | Product.                    |
|---------|----------|-------|---------------------------------------|-----|-----------------------------|
| Jan. 5, | \$372.50 | 0     | ×                                     | 37  | = 000                       |
| " 15,   | 264.25   | 10    | ×                                     | 26  | = 260                       |
| " 25,   | 227.50   | 20    | ×                                     | 23  | = 460                       |
| " 30,   | 329.10   | 25    | ×                                     | 33  | = 825                       |
|         |          |       |                                       | 119 | )1545 (12 $\frac{117}{119}$ |

## Usual Method.

$$\begin{array}{r}
 372.50 \times 0 = 000000 \\
 264.25 \times 10 = 264250 \\
 227.50 \times 20 = 455000 \\
 329.10 \times 25 = 822750 \\
 \hline
 1193.35 \qquad )1542000 ( 12 \frac{109980}{119335}
 \end{array}$$

Ans. Jan. 18th, by both methods, the difference being only about  $\frac{2}{119}$  of a day.

## Interest Method.

263. Find the interest on each amount for the time obtained as before; then find how long it will take the whole debt to gain the amount of interest thus found; the result will be the average time.

Note.—The equated time will be the same, whatever the rate of interest.

## EXAMPLE UNDER RULE I.

| Due.     | Amount.      | Days. | Int. at 6%.    |
|----------|--------------|-------|----------------|
| July 6,  | 300          | 0     | 000            |
| Aug. 7,  | 400          | 32    | 2.133          |
| Oct. 10, | 200          | 96    | 3.200          |
|          | <u>\$900</u> |       | <u>\$5.333</u> |

Interest on \$900 for 1 day = .150.

For \$900 to gain 5.333 requires  $(\$5.333 \div .150) 35 \frac{83}{150}$  days.

36 days from July 6th = Aug. 11th, Ans. as before.

2. Calculate the above at the rate of 12%, and at 4%.

## Abbreviated Method, by Interest.

264. Labor is saved by the use of the following rule in finding the time when due :

*Rule.*—Count the time from the FIRST day of the first month given.

Set opposite each month the number of months intervening between it and the first month.

This number added to the term of credit, with the day of the month opposite to which it is set, will give the time for which to calculate interest.

Then calculate interest for the months and days thus found, at 12 per cent. (that is, 1 per cent. per month), in the same manner as in the previous rule.

## EXAMPLE.

| Date of Sale. | Time of Credit. | Amount. |
|---------------|-----------------|---------|
| Jan. 6,       | 3 mos.          | \$300   |
| Feb. 12,      | 4 "             | 400     |
| Mar. 18,      | 3 "             | 250     |

## STATEMENT.

| Amount. | No. of Months from 1st mo. | Total Time, mos. days. | Int. at 12 per cent.                          |
|---------|----------------------------|------------------------|---|
| \$300   | 0                          | 3 6                    | { .60 = Int. for 6 days.<br>9.00 = " " 3 mos. |
| 400     | 1                          | 5 12                   | { 1.60 = " " 12 days.<br>20.00 = " " 5 mos.   |
| 250     | 2                          | 5 18                   | { 1.50 = " " 18 days.<br>12.50 = " " 5 mos.   |

\$950 Total Int. 45.20

Interest on amount of debt, \$950, for 1 mo. @ 12 % = \$9.50.

9.50) 45.20 ( 4 mos.

3800

720

30 days in a month.

950) 21600 ( 22 $\frac{70}{95}$  days.

Average time, 4 mos. 23 days, which, counted from Jan. 1st, gives May 23d, Ans.



## By Usual Method.

| Amount.    | When due. | Days. | Product.        |
|------------|-----------|-------|-----------------|
| \$300      | Apr. 6    | 0     | 000             |
| 400        | June 12   | 67    | 26800           |
| 250        | " 18      | 73    | 18250           |
| <u>950</u> |           |       |                 |
|            |           | 950)  | 45050 (47 days. |

47 days counted from April 6th, gives May 23d, as before.

By the abbreviated method, all the labor performed appears in the operation; but in the usual method, only a part of the work is written.

The abbreviated method is used to a considerable extent in New York, Philadelphia, and Boston, on account of the labor saved in counting time and in reckoning interest. Some have claimed that results may be obtained by this method with greater facility than by the use of Equation Tables.

In some instances, the result will not exactly agree with that obtained by the use of days for the time between the dates when due, from the fact that some months contain more days than others; but in ordinary cases the difference will be but a trifle, while the labor of averaging is very much diminished. The correct time may be obtained by adding to the total time one day for every month intervening between the first day and the day of maturity which contains 31 days.

## 2. Bought goods as follows:

|               |                        |
|---------------|------------------------|
| Jan. 8, 1882, | \$250 @ 3 mos. credit. |
| Feb. 13, "    | 360 " 4 " "            |
| Mar. 6, "     | 125 " 60 days "        |

What is the average date of payment?

3. When shall a note to settle the following account be made payable?

*Henry Field*

*To James L. Edwards Dr.*

|       |    |  |  |  |  |             |           |  |
|-------|----|--|--|--|--|-------------|-----------|--|
| 1882. |    |  |  |  |  |             |           |  |
| Mar.  | 3  | To Mdse. @ 3 mos., as per bill rendered, |  |  |  | 250         | 00        |  |
| Apr.  | 4  | " " " 30 days, " "                       |  |  |  | 100         | 00        |  |
| "     | 16 | " " " 60 " " "                           |  |  |  | 300         | 00        |  |
| May   | 1  | " " " 60 " " "                           |  |  |  | 420         | 00        |  |
|       |    |  |  |  |  | <u>1070</u> | <u>00</u> |  |

Average the following examples by each of the preceding rules:

## 4. A merchant bought goods as follows :

|                |           |       |                |          |
|----------------|-----------|-------|----------------|----------|
| Sept. 5, 1882, | a bill of | \$200 | on a credit of | 6 mos.   |
| Oct. 10, " "   | "         | 500   | "              | 3 "      |
| Nov. 11, " "   | "         | 350   | "              | 60 days. |
| Dec. 5, " "    | "         | 425   | for cash.      |          |

What is the average date for the payment of the whole?

5. John E. Lewis purchased goods of Isaac S. Smyth & Co. to the amount of \$5000, \$1250 to be paid June 2d, 1882, \$1000 to be paid July 5th, \$2000 to be paid Aug. 15th; the balance, \$750, will become due Aug. 30th. At what date must a single note for the whole amount be drawn, payable in 3 mos., that it may become due at the average date?

Required the average date for payment of the following bills:

## 6. Purchased goods of Cragin &amp; Co., as stated below :

|               |           |          |                   |
|---------------|-----------|----------|-------------------|
| Jan. 3, 1882, | a bill of | \$375.25 | on 3 mos. credit. |
| " 10, " "     | "         | 562.25   | " "               |
| " 15, " "     | "         | 250.00   | " "               |
| " 20, " "     | "         | 100.00   | " "               |
| " 24, " "     | "         | 225.75   | " "               |

## 7. Bought of Woodman &amp; Hammett as follows :

|                |           |          |           |
|----------------|-----------|----------|-----------|
| Dec. 10, 1882, | a bill of | \$175.25 | @ 4 mos.  |
| " 15, " "      | "         | 237.50   | " "       |
| " 31, " "      | "         | 150.00   | " "       |
| Jan. 4, 1883,  | "         | 325.00   | for cash. |

## 8. Purchased goods as follows :

|                |           |          |             |
|----------------|-----------|----------|-------------|
| Dec. 10, 1882, | a bill of | \$325.00 | at 3 mos.   |
| Jan. 15, 1883, | "         | 450.75   | at 60 days. |
| Jan. 20, " "   | "         | 500.00   | at 3 mos.   |
| Feb. 2, " "    | "         | 750.25   | at 3 mos.   |
| Feb. 15, " "   | "         | 600.00   | at 3 mos.   |

What is the average date, and what are the dates of 4 notes drawn at 60 days each, payable one month apart, to be equivalent to the average date?

## AVERAGE OF ACCOUNTS, OR COMPOUND EQUATION.

**265.** In the settlement of accounts it is frequently desirable to know when the balance of an account may be paid, so that interest need not be calculated and yet have neither party suffer loss. For instance, a commission merchant sells for a consignor, at a credit of 6 months, goods amounting to \$2000, the charges on which are \$500, due at the time of sale. Instead of remitting \$1500, the balance of account, as soon as the cash for the goods is received, the commission merchant retains it until the interest on \$1500 is equal to the interest on \$500 for 6 months; and as \$1500 is three times as large as \$500, he retains the balance  $\frac{1}{3}$  of 6 months, which is 2 months. This, added to the 6 months' credit, gives 8 months from the day of sale to the time when the balance of account should be paid. The principle involved is, that the person advancing the money is entitled to an equivalent, either by receiving interest, or retaining another sum until the interest on both sums is equal.

**266.** To find the equated time for the settlement of an account when there are both debit and credit amounts.

*Rule I.—1. Find the time when due for each side of the account separately.*

*2. Multiply the SMALLER side of the account by the time between the two dates thus found, and divide the product by the balance of the account. The quotient will be the time to be counted from the date of the larger side.*

*If the LARGER side of the account falls due LATEST, count FORWARD from the LATER date.*

*If the LARGER side of the account falls due EARLIEST, count BACK from the EARLIER date.*

**Note.**—This is the same as counting the time forward when the balance of interest is in favor of the person owing the balance of the account, and backward when the balance of interest is against him.

## EXAMPLES.

1. When shall a draft for the settlement of the following account be made payable?

| <i>Dr.</i>    |    |          |  | <i>James B. Chauncey.</i> |    |               |    | <i>Cr.</i> |      |    |  |
|---------------|----|----------|--|---------------------------|----|---------------|----|------------|------|----|--|
| 1882.<br>July | 16 | To Cash, |  | 600                       | 00 | 1882.<br>Aug. | 15 | By Mdse.,  | 1800 | 00 |  |

$$600 \times 30 = 18000$$

$$18000 \div 1200 = 15$$

15 days counted forward from the later date, on which the larger amount falls due, gives August 30th.

The interest on \$600 for 30 days equals that on \$18000 for 1 day; as many days are required, therefore, as 1200, the balance of the account, is contained times in 18000, which are 15. Then, as Mr. Chauncey has retained \$600 for 30 days, to get an equivalent, we retain the balance of account, \$1200, after it has become due, for fifteen days, which brings us to August 30th.

2. Find the time when the balance of the following account becomes due:

| <i>Dr.</i>    |    |           |  | <i>James B. Chauncey.</i> |    |               |    | <i>Cr.</i> |     |    |  |
|---------------|----|-----------|--|---------------------------|----|---------------|----|------------|-----|----|--|
| 1882.<br>Jan. | 16 | To Mdse., |  | 1800                      | 00 | 1882.<br>Feb. | 15 | By Cash,   | 600 | 00 |  |

From January 16th to February 15th = 30 days.

$$1800 - 600 = 1200 \text{ Bal. of account. } \text{Smaller side, } \$600 \\ \times 30 = 18000. \quad 18000 \div 1200 = 15.$$

15 days counted back from January 16th, the earlier date, gives January 1st.

In the above account, as Mr. Chauncey has had the use of \$600 for 30 days, he should pay interest on the balance, \$1200, for a time long enough to be an equivalent. \$600 for 30 days equals \$1200 for 15 days: therefore the time should be counted 15 days longer. To do this we count back from Jan. 16th, which gives us Jan. 1st as the average date or time from which interest should be reckoned.

3. The following account appears on my Ledger :

| Dr.           |    |                       |     | Samuel T. Hanson. |               |    |          | Cr. |    |  |  |
|---------------|----|-----------------------|-----|-------------------|---------------|----|----------|-----|----|--|--|
| 1882.<br>Jan. | 11 | To Mdse. at 6 months, | 171 | 24                | 1882.<br>Jan. | 11 | By Cash, | 100 | 00 |  |  |

When should the balance be paid, or draw interest?

From January 11th to July 11th, the time when the debit amount is due, is 181 days.

$$100 \times 181 = 18100$$

$$171.24 - 100 = 71.24, \text{ Bal. of account.}$$

$$18100 \div 71.24 = 254 +$$

Then 254 days counted forward from July 11th, the later date, is March 22d.

*Ans.* March 22, 1882.

4. Find the average of the following account :

| Dr.           |    |             |    | Charles D. Carlton. |               |    |                    | Cr. |    |  |  |
|---------------|----|-------------|----|---------------------|---------------|----|--------------------|-----|----|--|--|
| 1882.<br>Mar. | 31 | To Charges, | 31 | 31                  | 1882.<br>Mar. | 8  | By Mdse. @ 8 mos., | 323 | 00 |  |  |
|               |    |             |    |                     | "             | 4  | " " " 6 "          | 263 | 00 |  |  |
|               |    |             |    |                     | "             | 24 | " " " 6 "          | 241 | 00 |  |  |

Credits due October 3d.

*Ans.* Oct. 10.

The following rule is preferred by many as being more accurate, because fractions, in dividing the products, are avoided.

**267. Rule II.**—*Multiply each sum by the number of days intervening between the date of its maturity and the earliest day on which any sum on either side of the account becomes due.*

*Then divide the difference between the sum of the products on the debit and the sum of the products on the credit side, by the balance of the account.*

*The quotient will be the time to be counted FORWARD from the date on which the first amount becomes due, when the balance of the account and the difference of the sums of the products are BOTH ON THE SAME SIDE of the account, but BACKWARD from the same date if they are on OPPOSITE SIDES of the account.*

## EXAMPLE I.

## By Products.

| Due.     | Amt. | Days. | Product.               | Due.    | Amt. | Day. | Product. |
|----------|------|-------|------------------------|---------|------|------|----------|
| May 22,  | 300  | 0     |                        | May 27, | 200  | 5    | 1000     |
| June 1,  | 150  | 10    | 1500                   | June 6, | 100  | 15   | 1500     |
| July 11, | 200  | 50    | 10000                  | July 1, | 120  | 40   | 4800     |
|          | 650  |       | 11500                  |         | 420  |      | 7300     |
|          | 420  |       | 7300                   |         |      |      |          |
|          | 230  |       | 4200(18 $\frac{6}{23}$ |         |      |      |          |

18 days counted forward from May 22d gives June 9th.

The discount on the debit side of the account equals the interest of \$650 for the time which is equivalent to \$11500 for 1 day, and, starting at the same date, the discount on the credit side will equal the interest on \$420 for the time equivalent to \$7300 for 1 day. The balance of the account can remain unpaid as long after May 22d as the time required for it to equal \$4200 for 1 day, which is 18 days.

2. Average the following Ledger account:

Dr. *J. J. Hodgson, Lynchburg, Va.* Cr.

|       |    |                  |     |    |       |    |                   |     |    |
|-------|----|------------------|-----|----|-------|----|-------------------|-----|----|
| 1882. |    |                  |     |    | 1882. |    |                   |     |    |
| Sept. | 10 | To Mdse. 3 mos., | 125 | 00 | Sept. | 30 | By Mdse. 30 days, | 250 | 00 |
| Oct.  | 4  | " " 60 days,     | 416 | 50 | Nov.  | 15 | " Note 3 mos.,    | 300 | 00 |
| Nov.  | 11 | " " 30 "         | 217 | 45 | "     | 25 | " Mdse. (net),    | 650 | 00 |
| Dec.  | 12 | " Cash,          | 390 | 00 |       |    |                   |     |    |

## EXAMPLE III.

## By Interest.

| Due.     | Amt. | Days. | Int. 12<br>per cent. | Due.    | Amt. | Days. | Int. 12<br>per cent. |
|----------|------|-------|----------------------|---------|------|-------|----------------------|
| May 15,  | 2500 | 0     |                      | May 21, | 400  | 6     | .800                 |
| " 24,    | 1300 | 9     | 3.900                | " 30,   | 1200 | 15    | 6.000                |
| June 14, | 400  | 21    | 2.800                | June 2, | 800  | 18.   | 4.800                |
|          | 4200 |       | 6.700                |         | 2400 |       | 11.600               |
|          | 2400 |       |                      |         |      |       | 6.700                |
|          | 1800 |       |                      |         |      |       | 4.900                |

For \$1800 to gain \$4.90 it will require 8 $\frac{1}{2}$  days.

Eight days counted backwards from May 15th is May 7th.

If the account were settled May 15th, \$11.69 should be charged as interest, and \$6.70 allowed as discount. Instead of adding \$4.90 to the balance of the account, time is counted back to a date from which the interest on the balance of the account will equal the balance of interest.

## EXAMPLE IV.

## By Abbreviated Interest Method.

## CREDIT SIDE OF THE ACCOUNT.

| Date.<br>1882.         | Time of Credit. | Amt.         | No. mos. from<br>earliest mo. | Total Time,<br>mos. days. | Int. at 12 per cent.                 |
|------------------------|-----------------|--------------|-------------------------------|---------------------------|--------------------------------------|
| July 12,               | 3 mos.          | \$100        | 1                             | 4 12                      | \$4.000 int. 4 mos.<br>.400 " 12 ds. |
| Aug. 15,               | Cash            | 260          | 2                             | 2 15                      |                                      |
|                        |                 |              |                               |                           | 5.000 " 2 mos.                       |
|                        |                 |              |                               |                           | 1.250 " 15 ds.                       |
| Oct. 19,               | 3 mos.          | 350          | 4                             | 7 10                      | 24.500 " 7 mos.<br>1.050 " 9 ds.     |
|                        |                 | <u>\$700</u> |                               |                           |                                      |
|                        |                 |              |                               |                           | .117 " 1 day.                        |
| Total credit interest, |                 |              |                               |                           | \$36.317                             |

## DEBIT SIDE OF THE ACCOUNT.

| Date.<br>1882.   | Time of Credit. | Amt.       | No. mos. from<br>earliest mo. | Total Time,<br>mos. days. | Int. at 12 per cent.                  |
|------------------|-----------------|------------|-------------------------------|---------------------------|---------------------------------------|
| June 15,         | 3 mos.          | \$200      | 0                             | 3 15                      | \$6.000 int. 3 mos.<br>1.000 " 15 ds. |
| Aug. 9,          | 3 "             | 400        | 2                             | 5 9                       |                                       |
|                  |                 |            |                               |                           | 20.000 " 5 mos.                       |
|                  |                 |            |                               |                           | 1.200 " 9 ds.                         |
| Sept. 18,        | 1 "             | 300        | 3                             | 4 18                      | 12.000 " 4 mos.<br>1.800 " 18 ds.     |
|                  |                 | <u>900</u> |                               |                           |                                       |
|                  |                 | 700        |                               |                           | Total debit int. 42.000               |
|                  |                 |            |                               |                           | " credit " 36.317                     |
| Bal. of account, |                 | \$200      |                               |                           | Bal. of interest, \$5.683             |

Interest on \$200 for 1 month = \$2.

$$5.683 \div 2 = 2 \text{ months } 25 \text{ days.}$$

2 months 25 days forward from June 1st is Aug. 25th, *Ans.*

See notes under example on page 155.

Average the following Ledger account:

| Dr.   |    |    |                  | Parker Burton. |    |       |    | Cr. |           |     |    |
|-------|----|----|------------------|----------------|----|-------|----|-----|-----------|-----|----|
| 1882. |    |    |                  |                |    |       |    |     |           |     |    |
| May   | 22 | To | Mdse. at 3 mos., | 500            | 00 | 1882. | 25 | By  | Cash,     | 300 | 00 |
|       | 29 | "  | " " "            | 250            | 00 | May   | 9  | "   | Sundries, | 400 | 00 |
| June  | 10 | "  | " " 30 days,     | 150            | 00 | June  | 2  | "   | Cash,     | 100 | 00 |
|       |    |    |                  |                |    | July  |    |     |           |     |    |

Ans. Balance \$100, due per average.

268. In commission houses, when an interest account is kept with the consignors, account sales are averaged to know when the proceeds should be paid or draw interest. For this purpose the rule in Art. 267 is preferred by many.

Account Sales are averaged by taking all sales or proceeds as on one side of an account, and all charges as on the other. Interest is generally added to any item of charges from the day when the item was due to the date of the account sales, all charges being then treated as due on the same date, that of the account sales. Commission is due on the day the goods are sold, or not, as may be agreed.

Average the following Account Sales:

*Account Sales of Merchandise for joint account of NEWHALL, HART & Co., H. FOSTER & Co., and Ourselves.*

|       |   |      |   |         |     |    |  |  |  |  |  |
|-------|---|------|---|---------|-----|----|--|--|--|--|--|
| 1882. |   |      |   |         |     |    |  |  |  |  |  |
| April | 9 | Sold | Leonard Barker & Co., @ 6 mos.:                               |         |     |    |  |  |  |  |  |
|       |   | ⬢    | 15 hhds. Cuba Sugar, 25,422 lbs., @ 16c.                      | \$4067  | 52  |    |  |  |  |  |  |
|       |   | ⬢    | 32 half-chests Oolong Tea, 1805 lbs., tare 480 = 1325, @ 1.10 | 1457    | 50  |    |  |  |  |  |  |
|       |   |      |   | \$5525  | 02  |    |  |  |  |  |  |
|       |   |      | CHARGES.  |         |     |    |  |  |  |  |  |
|       |   |      | Fire Ins. on \$6000 @ 1½ %,                                   | \$90.00 |     |    |  |  |  |  |  |
|       |   |      | Cooperage, Weighing, Labor, &c.,                              | 17.37   |     |    |  |  |  |  |  |
|       |   |      | Com. and Guar. on \$5525 @ 5 %,                               | 276.25  | 383 | 62 |  |  |  |  |  |
|       |   |      | Net proceeds due per average,                                 | \$5141  | 40  |    |  |  |  |  |  |

PAUL & THOMPSON.

E. E., NEW YORK, April 9th, 1882.



*Sales of Flour for account and risk of BEAVER & WHITE,  
St. Paul, Minn.*

|       |    |                                    |         |        |    |
|-------|----|------------------------------------|---------|--------|----|
| 1882. |    |                                    |         |        |    |
| July  | 15 | 500 bbls. 30 days @ 6.50           |         | \$3250 | 00 |
| "     | 30 | 300 " " " " 7.00                   |         | 2100   | 00 |
| Aug.  | 10 | 600 " " " " 6.75                   |         | 4050   | 00 |
|       |    |                                    |         | <hr/>  |    |
|       |    |                                    |         | \$9400 | 00 |
|       |    | CHARGES.                           |         |        |    |
|       |    | Storage, Labor, and Cooperage,     | \$71.25 |        |    |
|       |    | Ins. on \$9000 @ $\frac{1}{2}$ %,  | 11.25   |        |    |
|       |    | Com. on \$9400 @ 2 <sup>s</sup> %, | 235.00  | 317    | 50 |
|       |    | Net proceeds due per average,      |         | <hr/>  |    |
|       |    |                                    |         | \$9082 | 50 |

L. T. WASHBURN & Co.

PHILADELPHIA, Aug. 12th, 1882.

*ACCOUNT SALES of Fruits per steamer "Oriola," from Liver-  
pool, and sold by order and for account of MESSRS. RIQUA,  
OSBORN & Co.*

|       |    |   |          |        |    |
|-------|----|---|----------|--------|----|
| 1882. |    |   |          |        |    |
| May   | 10 | 1000 kilogrammes Prunes, 60 days @ 70¢      |          | \$700  | 00 |
| June  | 12 | 2 bbls. Currants, 30 days                   |          |        |    |
|       |    | 268 — 28                                    |          |        |    |
|       |    | 273 — 27                                    |          |        |    |
|       |    | 541 — 55 = 486 lbs. net @ 17 <sup>s</sup> ¢ |          | 85     | 05 |
| "     | 25 | 1 case Figs, 60 days                        |          |        |    |
|       |    | 297 — 35 — 30 = 232 lbs. @ 30¢              |          | 69     | 60 |
| July  | 17 | 100 bags Peanuts, 30 days,                  |          |        |    |
|       |    | 252 <sup>s</sup> bush. @ \$3                |          | 757    | 50 |
|       |    |   |          | <hr/>  |    |
|       |    |   |          | 1612   | 15 |
|       |    | CHARGES.                                    |          |        |    |
|       |    | Duties on \$950 @ 20 %,                     | \$190.00 |        |    |
|       |    | Freight, Storage, and Labor,                | 225.50   |        |    |
|       |    | Commission on \$1612.15 @ 2 <sup>s</sup> %, | 40.30    | 455    | 80 |
|       |    | Net proceeds due,                           |          | <hr/>  |    |
|       |    |   |          | \$1156 | 35 |

RALSTON, POTTER & Co.

Boston, July 17th, 1882.

For additional practice, average the examples already given by each of the different methods.

## MISCELLANEOUS EXAMPLES.

## 1. Average the following Ledger account :

|       |    |                 |     |    |      |       |                    |     |    |  |  |
|-------|----|-----------------|-----|----|------|-------|--------------------|-----|----|--|--|
| 1882. |    |                 |     |    |      | 1882. |                    |     |    |  |  |
| Mar.  | 10 | To Mdse. (net), | 250 | 75 | Mar. | 20    | By Cash,           | 250 | 75 |  |  |
| "     | 15 | " " @ 3 mos.,   | 187 | 50 | "    | 2     | " Draft @ 30 days, | 120 | 00 |  |  |
| Apr.  | 14 | " " 4 "         | 262 | 25 | Apr. | 26    | " Cash,            | 150 | 00 |  |  |
| May   | 24 | " " 8 "         | 465 | 60 | May  | 24    | " Sundries,        | 50  | 00 |  |  |

2. If A lends B \$300 for 4 months, how long ought B to lend A \$600, to equal the favor? *Ans.* 2 months.

3. James Cranston purchased an invoice of goods for \$2500, due in 60 days. Thirty days after the purchase he paid \$1000. How long may he keep the balance as an equivalent?

4. A man bought goods at different times to the amount of \$10,000, which are due per average July 1st. He wishes to give 4 notes in payment, due 1 month apart. When ought they to mature, to equal the average?

*Ans.* May 15th, June 15th, July 15th, Aug. 15th.

The table on the following page will be found useful in averaging accounts :

**Explanation.**—To find the time between two dates:—Look on the left for the month containing the earlier date, and on the same line, to the right, for the month containing the later date: the number of days under the name of the month, or the number of months at the top of the column, will give the required time, if both dates are on the same day of the month. If the day of the month of the later date is different from that of the earlier date, add or subtract, as the case may be. If February intervenes, add one more day in leap year.

To find the day which is a given number of days after a certain date:—Find the number of days in the table, opposite the month, containing the given date which is next larger than the given number of days; subtract the given number of days, and count back from the same day of the month above the number taken, as the day of the month of the given date.

For example, to find the day which is 144 days after June 28th, look opposite June for the number next greater than 144, which is 153 in Nov.  $144 \text{ from } 153 = 9$ ; and 9 days back from Nov. 28th brings us to Nov. 19th, the required date.

## TIME TABLE.

## TIME TABLE.

Showing the Time, in months and in days, from any day in one month to the same day in any other month, and also what month is a given number of days from another month.

| No. days. | No. of mo. | From        | 1 mo.            | 2 mos.           | 3 mos.           | 4 mos.          | 5 mos.          | 6 mos.          | 7 mos.          | 8 mos.          | 9 mos.         | 10 mos.        | 11 mos.        | 12 mos.         |
|-----------|------------|-------------|------------------|------------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-----------------|
| 31        | 1          | January to  | Feb., 31 days.   | March, 59 days.  | April, 90 days.  | May, 120 ds.    | June, 151 ds.   | July, 181 ds.   | August, 212 ds. | Sept., 243 ds.  | Oct., 273 ds.  | Nov., 304 ds.  | Dec., 334 ds.  | Jan., 365 ds.   |
| 28        | 2          | February "  | March, 28 days.  | April, 59 days.  | May, 89 days.    | June, 120 ds.   | July, 150 ds.   | August, 181 ds. | Sept., 212 ds.  | Oct., 242 ds.   | Nov., 273 ds.  | Dec., 303 ds.  | Jan., 334 ds.  | Feb., 365 ds.   |
| 31        | 3          | March "     | April, 31 days.  | May, 61 days.    | June, 92 days.   | July, 122 ds.   | August, 153 ds. | Sept., 184 ds.  | Oct., 214 ds.   | Nov., 245 ds.   | Dec., 275 ds.  | Jan., 306 ds.  | Feb., 337 ds.  | March, 365 ds.  |
| 30        | 4          | April "     | May, 30 days.    | June, 61 days.   | July, 91 days.   | August, 122 ds. | Sept., 153 ds.  | Oct., 183 ds.   | Nov., 214 ds.   | Dec., 244 ds.   | Jan., 275 ds.  | Feb., 306 ds.  | March, 334 ds. | April, 365 ds.  |
| 31        | 5          | May "       | June, 31 days.   | July, 61 days.   | August, 92 days. | Sept., 123 ds.  | Oct., 153 ds.   | Nov., 184 ds.   | Dec., 214 ds.   | Jan., 245 ds.   | Feb., 276 ds.  | March, 304 ds. | April, 335 ds. | May, 365 ds.    |
| 30        | 6          | June "      | July, 30 days.   | August, 61 days. | Sept., 92 days.  | Oct., 122 ds.   | Nov., 153 ds.   | Dec., 183 ds.   | Jan., 214 ds.   | Feb., 245 ds.   | March, 275 ds. | April, 304 ds. | May, 334 ds.   | June, 365 ds.   |
| 31        | 7          | July "      | August, 31 days. | Sept., 62 days.  | Oct., 92 days.   | Nov., 123 ds.   | Dec., 153 ds.   | Jan., 184 ds.   | Feb., 215 ds.   | March, 246 ds.  | April, 276 ds. | May, 304 ds.   | June, 335 ds.  | July, 365 ds.   |
| 31        | 8          | August "    | Sept., 31 days.  | Oct., 61 days.   | Nov., 92 days.   | Dec., 122 ds.   | Jan., 153 ds.   | Feb., 184 ds.   | March, 215 ds.  | April, 246 ds.  | May, 276 ds.   | June, 304 ds.  | July, 334 ds.  | August, 365 ds. |
| 30        | 9          | Sept'mb'r " | Oct., 30 days.   | Nov., 61 days.   | Dec., 92 days.   | Jan., 122 ds.   | Feb., 153 ds.   | March, 183 ds.  | April, 214 ds.  | May, 245 ds.    | June, 275 ds.  | July, 304 ds.  | Aug., 334 ds.  | Sept., 365 ds.  |
| 31        | 10         | October "   | Nov., 31 days.   | Dec., 61 days.   | Jan., 92 days.   | Feb., 123 ds.   | March, 153 ds.  | April, 183 ds.  | May, 214 ds.    | June, 245 ds.   | July, 275 ds.  | Aug., 304 ds.  | Sept., 334 ds. | Oct., 365 ds.   |
| 30        | 11         | Nov'mb'r "  | Dec., 30 days.   | Jan., 61 days.   | Feb., 92 days.   | March, 123 ds.  | April, 153 ds.  | May, 183 ds.    | June, 214 ds.   | July, 245 ds.   | Aug., 275 ds.  | Sept., 304 ds. | Oct., 334 ds.  | Nov., 365 ds.   |
| 31        | 12         | Decemb'r "  | Jan., 31 days.   | Feb., 62 days.   | March, 90 days.  | April, 121 ds.  | May, 151 ds.    | June, 182 ds.   | July, 212 ds.   | August, 243 ds. | Sept., 274 ds. | Oct., 304 ds.  | Nov., 335 ds.  | Dec., 365 ds.   |

## STORAGE.

Storage is charged at a certain price per barrel, bale, box, etc., according to regulations adopted by the Chambers of Commerce or Boards of Trade of the different cities.

All goods stored are subject to one month's storage. In some places, if they remain any part of a month, they are charged for a full month; in others, after the first month, if taken out within fifteen days, a half-month is charged; if after fifteen days, a whole month. When goods are received and delivered at the pleasure of the consignor, the dues for storage are usually determined by an average.

To compute storage.

*Rule.*—Multiply the number of barrels, or other articles, first entered, by the number of days between the time of entrance and the time of the first delivery, or second entrance. Then

Multiply each balance by the number of days it continues unchanged.

The sum of all the products will equal the number of articles in store for one day. To find the number stored for one month, divide the sum of the products by 30.

**EXAMPLE.**—What is the cost of storage, at 1¢ per bushel per month, of wheat received and delivered as per following account, closed October 2d, 1882?

*Account of Storage of Wheat received and delivered for account of A. Y. RODGERS & Co., St. Louis.*

| Date.                | Received. | Delivered. | Balances. | Days. | Products.         |
|----------------------|-----------|------------|-----------|-------|-------------------|
| 1882.                |           |            |           |       |                   |
| July 2               | 200       |            | 200       | 9     | 1800              |
| " 11                 |           | 150        | 50        | 5     | 250               |
| " 16                 | 350       |            | 400       | 5     | 2000              |
| " 21                 |           | 300        | 100       | 20    | 2000              |
| August 10            | 400       |            | 500       | 5     | 2500              |
| " 15                 |           | 450        | 50        | 5     | 250               |
| " 20                 |           | 50         | 0         | 0     | 0000              |
| September 5          | 200       |            | 200       | 5     | 1000              |
| " 10                 | 100       |            | 300       | 5     | 1500              |
| " 15                 |           | 200        | 100       | 17    | 1700              |
|                      | 1250      | 1150       |           |       | 30)13000          |
| Bal. on hand Oct. 2, |           | 100        |           |       | 433 $\frac{1}{3}$ |
|                      | 1250      | 1250       |           |       |                   |

$$433\frac{1}{3} \times 1\text{¢} = \$4.33, \text{ Ans}$$

## EXCHANGE.

**269.** The term **Exchange**, in commerce, signifies the giving or receiving of one currency for its value in another; or, the method of making payments by means of written orders without the transmission of money. See **BILLS OF EXCHANGE**, page 349.

**270.** **Exchange** is of two kinds, *Domestic* or *Inland*, and *Foreign*.

**271.** **Domestic Exchange** includes the exchanges made within the limits of one country.

**272.** **Foreign Exchange** relates to the transactions between different countries.

**273.** **Nominal Exchange** has reference to the comparative market value of the currencies of different countries.

**274.** **Real Exchange** is that which relates to the interchange of commodities without reference to the precious metals.

**275.** The **True or Intrinsic Par of Exchange** between two countries is the *exact equivalent of pure metal* in the coined piece which forms the unit of price of one country compared with the currency of the other. The alloy is reckoned of no value.

**276.** "Thus, according to the mint regulations of Great Britain and France, £1 sterling is equal to 25 fr. 20 cent., which is said to be the par between London and Paris. Exchange between the two countries is said to be at par when bills are negotiated at this rate; that is, when a bill for £100 drawn in London is worth 2520 francs in Paris, and conversely. When £1 in London buys a bill on Paris for more than 25 fr. 20 cent., the exchange is said to be in favor of London and against Paris; when £1 in London will not buy a bill on Paris for 25 fr. 20 cent., exchange is against London and in favor of Paris.

**277.** "Exchange is made to diverge from par by any discrepancy between the actual weight or fineness of the coins and the mint standard, and by the variations in the demand and supply of bills of exchange.

"The cost of conveying bullion or coin forms the limit within which the rise and fall of real exchange is confined; for if a merchant can send a bill for less than the expense of sending gold, he will send a bill, but if sending a bill would cost more than the expense and risk of sending gold, then he will send gold."

**278. The Commercial Par of Exchange** is the market value of the currency of one country when sold for the currency of another.

**279. The Course or Rate of Exchange** is the current prices of exchanges, or the *variable* price of the money of one country which is paid for a *fixed* amount of that of another country.

#### DOMESTIC EXCHANGE.

**280.** The cost of exchange depends upon the course of trade and the difficulties of transmitting money from one place to another.

To find the cost of a Draft at sight.

*Rule.*—Add the premium to the face of the Draft, or subtract the discount.

1. How much must be paid for a Draft of \$1000 on New York at a premium of  $1\frac{1}{2}\%$ ?

$$\begin{array}{r} 1\frac{1}{2}\% \text{ of } \$1000 = \$15 \text{ premium.} \\ \quad \quad \quad 1000 \text{ face of draft.} \\ \hline \$1015 \text{ total cost.} \end{array}$$

2. How much must be paid for a Draft of \$600 on Memphis at a discount of  $1\%$ ?

$$\begin{array}{r} \$600 \text{ face of draft.} \\ 1\% \text{ of } \$600 = \quad \quad 6 \text{ discount.} \\ \hline \$594 \text{ cost of draft.} \end{array}$$

3. What is the cost of a draft for \$1200 @  $\frac{1}{4}\%$  discount?

**281.** To find the Face of a Draft, the cost and rate being given.

*Rule.*—Divide the cost by \$1 plus the rate of premium, or \$1 minus the rate of discount.

1. A draft was purchased on St. Louis for \$3226.05, at a premium of  $\frac{1}{2}\%$ , and another on Savannah for \$2397.88, at a discount of  $\frac{1}{4}\%$ . What was the face of each?

$$\begin{array}{l} 1.00 + .005 = 1.005 \quad \$3226.05 (\$3210 \text{ face of draft on St. Louis.}) \\ 1.00 - .0075 = .9925 \quad \$2397.88 (\$2416 \text{ face of draft on Savannah.}) \end{array}$$

2. What was the cost of a bill for \$240 on New York, purchased at  $1\frac{1}{2}\%$  premium? *Ans.* \$243.

3. What is the cost of a draft on New Orleans for \$1800, at  $1\frac{3}{4}\%$  premium?

4. Sold \$375 uncurrent money at  $2\frac{1}{4}\%$  discount. How much did I receive? How much did I lose?

5. Exchanged \$600 in bank notes for gold at  $5\%$  premium. How much did I receive?

6. Bought goods, \$1250, and sold them at a profit of  $25\%$ ; purchased a draft on St. Louis with the proceeds, at a discount of  $\frac{3}{4}\%$ . What was the amount of the draft?

7. Shipped goods to Havana, and received a draft for \$2500, which gave me a profit of  $20\%$ ; sold the draft at  $4\frac{1}{2}\%$  premium. How much did I gain by both transactions?

8. A commission merchant sold goods, the net proceeds of which were \$2750. How large a draft can he buy to remit to his consignor, if he pays  $2\frac{1}{2}\%$  premium for the draft? How large a draft if he purchases at  $2\frac{1}{2}\%$  discount?

9. Required the amount to pay for a draft to be remitted to Hart & Denton, Charleston, S. C., for \$1250, exchange at  $\frac{1}{4}\%$  discount.

#### FOREIGN EXCHANGE.

**282.** Bills of Exchange are generally drawn in the money of the country in which they are made payable. (See *Forms of BILLS OF EXCHANGE*, page 352.) Nearly all the Bills of Exchange drawn in this country are drawn and negotiated on one of the following places, viz., London, Paris, Antwerp, Bremen, Berlin, Hamburg, Frankfort, Leipsic, Cologne, and Amsterdam.

In Foreign Exchange it is usual to reckon the money of one country as fixed and the other as variable, and in quotations to give only the variable prices. Thus, a bill on Paris is quoted at so many francs per dollar, the dollar being the fixed price and the francs the variable price. A bill on Amsterdam is quoted at so many cents per guilder, which is called the fixed price and the cents the variable price.

## Quotations of Foreign Bills of Exchange.

|                                 |         |                                     |
|---------------------------------|---------|-------------------------------------|
| <b>LONDON:</b>                  |         | <b>ANTWERP:</b> 60 days.....5.28    |
| Bankers, 60 days.....4.82       | @ 4.85  | Swiss Bankers, 60 days.....5.24     |
| do. 3 ds. sight.....4.85        | @ 4.86  | Amsterdam Bankers, 60 days......39½ |
| Commercial, 60 days.....4.81½   | @ 4.83½ | do. 3 ds. sight......40½            |
| Documentary, do. ....4.80       | @ 4.83  | Reichsmarks (4):                    |
| Cable transfers, 60 days...4.86 | @ 4.86½ | Bankers, 60 days......94¼           |
| PARIS: 60 days.....5.24         | @ 5.22  | do. 3 ds. sight......95             |
| 3 ds. sight.....                | 5.20    |                                     |

**283. Explanation.**—LONDON, bankers, signify those drawn on bankers in London. Those at 60 days are generally less than those at sight because of the interest lost. \$4.84 @ \$4.85 are the rates per pound sterling, the two rates indicating the fluctuations during the day. Intrinsic par £1 = \$4.8665. **Commercial bills** are drafts on merchants. **Documentary bills** signify those the payment of which is secured by the hypothecation of Bills of Lading or other securities. **Cable transfers** signify the modern method of placing sums to the credit of persons abroad by means of the Atlantic Cable. Transfers are effected to different parts of this country by telegraph in the same manner.

**284. Exchange on Paris, Antwerp, and Switzerland** is quoted at so many francs per \$1. The *Drachma* of Greece, the *Lire* of Italy, and *Peseta* of Spain are of the same intrinsic value as the franc of France. Intrinsic par 5.18+ fcs. = \$1, or 19.3 cts. per franc.

**285. On Amsterdam,** bills are drawn payable in Guilders or Florins; the quotation is the number of cents to the guilder. Intrinsic par, 1 guilder = 40½ cents.

**286. On Bremen, Hamburg, Frankfort, and Berlin,** quotations are based on the cost of four Reichsmarks (Royal marks), and 94¼ @ 95 mean the number of cents for 4 marks. Intrinsic par 1 mark = 23.8 cts. ; 4 marks = 95.2 cts.

See, also, **BILLS OF EXCHANGE** and **LETTERS OF CREDIT**, page 353.

## EXCHANGE ON ENGLAND.

£1 = 20 shillings, each 12 pence, each 4 farthings.

The English Sovereign is the coined piece of which the pound sterling is the money of account. This was formerly valued by the old Spanish Carolus pillar dollar, now entirely out of circulation. Of these \$4.44½ were equivalent to the



pound sterling. This rate originally represented the true par of exchange between the two countries. In 1834 the eagle was reduced in weight to 258 grains, and now contains 232.2 grains pure gold. This requires a premium on the old basis of about  $9\frac{1}{2}$  per cent. to equal the present par.

Standard weight of Sovereign, grains . . . 123.274

Alloy  $\frac{1}{12}$  part . . . . . 10.273

Fine gold in the Sovereign . . . 113.001

Present value of Eagle, \$10 = 232.2; \$1 = 23.22 grains.

$$113.001 \div 23.22 = 4.8665$$

The equivalent of the pound sterling, therefore, is \$4.8665, the rate established at the United States mint, and is the value fixed by Congress for estimating duties at the Custom-Houses, and for all government purposes.

**287. To find the value of sterling money.**

*Rule.*—Reduce the shillings and pence, if any, to the decimal of a pound, and multiply by the given rate per pound.

*Note.*—To reduce shillings and pence to the decimals of a pound, see pages 99, 103, and also Table, page 175.

1. What must be paid for a bill of exchange on Liverpool for £310 10s. 6d., exchange being quoted at \$4.85?

|                               |                                     |
|-------------------------------|-------------------------------------|
| $6 \times \frac{1}{8} = .025$ | $\$10.525$ face of bill.            |
| $10 \times 5 = .50$           | $4.85$ cost per £.                  |
| <hr/> $10s. 6d. = .525$       | <hr/>                               |
|                               | 1552625                             |
|                               | 2484200                             |
|                               | <hr/> 1242100                       |
|                               | <hr/> 1506.04625    Ans. \$1506.05. |

2. What will be the cost of the following bill of exchange at \$4.87½ per pound?

£150.

New York, June 13, 1882.

Sixty days after sight of this FIRST of EXCHANGE (Second and Third of same tenor and date unpaid), pay to the order of R. J. Milligan One Hundred and Fifty Pounds, value received, and charge the same to account of

Brown & Bros.

To Brown, Shipley & Co., Liverpool, England.

3. A merchant wishes to remit a bill of exchange to pay for an Invoice received from Manchester, Eng., amounting to £720 8s. 6d. How much will he have to pay, United States money, when exchange is quoted at \$4.89½?

4. Gave an order to a broker to purchase and remit to Edinburgh £420 15s. 9d. With exchange @ \$4.86, and brokerage ½ %, what did I have to pay the broker?

5. Find the cost of a bill of exchange for £2500 18s. 3d. @ \$4.80, @ \$4.83½. At \$4.89½, @ \$4.90.

6. What is the value of £1000 @ \$4.82½? Of £225 10s. 6d. @ \$4.81½? Of £1600 3s. 9d. @ \$4.89½?

288. To change U. S. money to Sterling.

*Rule.*—Divide the given amount by the value of £1 at the given rate.

Reduce the remainder, or the decimals in the quotient, if any, to shillings and pence. (See Art. 157, page 97.)

1. How large a bill on London can be bought for \$1475.50, exchange at \$4.85?

|   |   |
|---|---|
| $4.85) \$1475.50 (£304$<br>$\underline{1455}$<br>$2050$<br>$\underline{1940}$<br>$110$<br><i>Shillings in a £,</i> $\underline{20}$<br>$4.85) 2200 (4s.$<br>$\underline{1940}$<br>$260$<br><i>Pence in a s.,</i> $\underline{12}$<br>$4.85) 3120 (6d.$<br>$\underline{2910}$<br>$210$<br><br>$Ans. £304 4s. 6\frac{1}{2}d.$ | $4.85) 1475.50 (304.2268$<br>$\underline{20}$<br><i>Shillings,</i> $\underline{4.5360}$<br>$\underline{12}$<br><i>Pence,</i> $\underline{6.4320}$<br><br>$Ans. £304 4s. 6\frac{1}{2}d.$ |
|---|---|

2. A commission merchant wishes to remit to a London consignor the proceeds of a consignment amounting to \$4350. Required the amount of the bill of exchange he can send when sterling exchange is quoted at \$4.87½.

3. Find the face of a bill of exchange that can be bought for \$11,634, exchange at \$4.87 At \$4.90. At \$4.83½. At \$4.85. At \$4.87½. At \$4.86½.

4. On an Invoice of £450, what is the difference between the Custom-House valuation and the exchange rate of \$4.80?

5. The cost of a bill of exchange on Liverpool for £734 12s. 6d. was \$3584.97. What was the rate? *Ans.* 4.88.

6. At \$9506.25 for £1950, what was the rate? At \$1946.43 for £400? At \$12,115.25 for £2500?

The cost of goods imported from England is often estimated by adding the proportion of charges to the value of the pound or shilling. For example :

An invoice amounts to £2400, which, with exchange at

|   |       |            |
|---|-------|------------|
| \$4.8665, =                                   | ..... | \$11679.60 |
| Duties, freight, and other charges, amount to | ..... | 608.40     |
| Making the total cost                         | ..... | \$12288.00 |

Then, if £2400 cost \$12,288, one pound cost  $12,288 \div 2400 = \$5.12$ , and one shilling cost  $25\frac{1}{6}$  cts., 1 penny  $2\frac{1}{8}$  cts. Cloth at 16d. per yd. would cost 34 cents.



#### MISCELLANEOUS EXAMPLES.

1. It has been the custom to reckon freight bills at \$4.80 per pound. At that rate, what must be paid for freight on an invoice weighing 650 lbs., @ 5 shillings per hundred lbs?

2. If a traveller receives on his letter of credit £75 6s., for how much will he be charged at \$4.88 per pound, adding  $\frac{1}{2}\%$  banker's commission, and  $6\%$  interest for 4 months?

3. A correspondent in London reports the proceeds of a consignment to be £1325 8s. 6d. How much can be obtained for this amount, if a bill is sold at \$4.83½?

## STERLING TABLE.

Calculated at \$4.8665 to £1, Act of Congress which went into effect January 1st, 1874.

| £  | \$ cts. m. | £  | \$ cts. m. | £  | \$ cts. m. | £   | \$ cts. m. |
|----|------------|----|------------|----|------------|-----|------------|
| 1  | 4.8665     | 26 | 126.529    | 51 | 248.1915   | 76  | 369.854    |
| 2  | 9.733      | 27 | 131.3955   | 52 | 253.058    | 77  | 374.7205   |
| 3  | 14.5995    | 28 | 136.262    | 53 | 257.9245   | 78  | 379.587    |
| 4  | 19.466     | 29 | 141.1285   | 54 | 262.791    | 79  | 384.4535   |
| 5  | 24.3325    | 30 | 145.995    | 55 | 267.6575   | 80  | 389.32     |
| 6  | 29.199     |    |            | 56 | 272.524    |     |            |
| 7  | 34.0655    | 31 | 150.8615   | 57 | 277.3905   | 81  | 394.1865   |
| 8  | 38.932     | 32 | 155.728    | 58 | 282.257    | 82  | 399.053    |
| 9  | 43.7985    | 33 | 160.5945   | 59 | 287.1235   | 83  | 403.9195   |
| 10 | 48.665     | 34 | 165.461    | 60 | 291.99     | 84  | 408.786    |
|    |            | 35 | 170.3275   |    |            | 85  | 413.6525   |
| 11 | 53.5315    | 36 | 175.194    | 61 | 296.8565   | 86  | 418.519    |
| 12 | 58.398     | 37 | 180.0605   | 62 | 301.723    | 87  | 423.3855   |
| 13 | 63.2645    | 38 | 184.927    | 63 | 306.5895   | 88  | 428.252    |
| 14 | 68.131     | 39 | 189.7935   | 64 | 311.456    | 89  | 433.1185   |
| 15 | 72.9975    | 40 | 194.66     | 65 | 316.3225   | 90  | 437.985    |
| 16 | 77.864     |    |            | 66 | 321.189    |     |            |
| 17 | 82.7305    | 41 | 199.5265   | 67 | 326.0555   | 91  | 442.8515   |
| 18 | 87.597     | 42 | 204.393    | 68 | 330.922    | 92  | 447.718    |
| 19 | 92.4635    | 43 | 209.2595   | 69 | 335.7885   | 93  | 452.5845   |
| 20 | 97.33      | 44 | 214.126    | 70 | 340.655    | 94  | 457.451    |
|    |            | 45 | 218.9925   |    |            | 95  | 462.3175   |
| 21 | 102.1965   | 46 | 223.859    | 71 | 345.5215   | 96  | 467.184    |
| 22 | 107.063    | 47 | 228.7255   | 72 | 350.388    | 97  | 472.0505   |
| 23 | 111.9295   | 48 | 233.592    | 73 | 355.2545   | 98  | 476.917    |
| 24 | 116.796    | 49 | 238.4585   | 74 | 360.121    | 99  | 481.7835   |
| 25 | 121.6625   | 50 | 243.325    | 75 | 364.9875   | 100 | 486.65     |

To find the value of any given amount not mentioned in the table, take the sum of those numbers that will equal the given amount. For 10 times any number in the table move the decimal point *one* place to the right, for 100 times move the point *two* places, etc.

Duties are now calculated at the above values.

**Value of Pence and Shillings at \$4.8665 per Pound.**

| Pence. | Cents.                            | Shillings. | \$ cts.                             | Shillings. | \$ cts. |
|--------|-----------------------------------|------------|-------------------------------------|------------|---------|
| 1      | 2 <sup>1111</sup> <sub>4000</sub> | 1          | .24 <sup>1111</sup> <sub>4000</sub> | 11         | 2.68    |
| 2      | 4                                 | 2          | .49                                 | 12         | 2.92    |
| 3      | 6                                 | 3          | .73                                 | 13         | 3.16    |
| 4      | 8                                 | 4          | .97                                 | 14         | 3.41    |
| 5      | 10                                | 5          | 1.22                                | 15         | 3.65    |
| 6      | 12                                | 6          | 1.46                                | 16         | 3.89    |
| 7      | 14                                | 7          | 1.70                                | 17         | 4.14    |
| 8      | 16                                | 8          | 1.95                                | 18         | 4.38    |
| 9      | 18                                | 9          | 2.19                                | 19         | 4.62    |
| 10     | 20                                | 10         | 2.43                                | 20         | 4.87    |
| 11     | 22                                |            |                                     |            |         |
| 12     | 24                                |            |                                     |            |         |

**Decimal Equivalents of parts of a Pound Sterling.**

| Pence.        |         |    |         | Shillings. |     |    |      |
|---------------|---------|----|---------|------------|-----|----|------|
| $\frac{1}{4}$ | .001042 | 6  | .025    | 1          | .05 | 11 | .55  |
| $\frac{1}{2}$ | .002083 | 7  | .029167 | 2          | .10 | 12 | .60  |
| $\frac{3}{4}$ | .003125 | 8  | .033333 | 3          | .15 | 13 | .65  |
| 1             | .004167 | 9  | .0375   | 4          | .20 | 14 | .70  |
| 2             | .008333 | 10 | .04167  | 5          | .25 | 15 | .75  |
| 3             | .0125   | 11 | .045833 | 6          | .30 | 16 | .80  |
| 4             | .016666 | 12 | .05     | 7          | .35 | 17 | .85  |
| 5             | .020833 |    |         | 8          | .40 | 18 | .90  |
|               |         |    |         | 9          | .45 | 19 | .95  |
|               |         |    |         | 10         | .50 | 20 | 1.00 |

The decimal which is equal to any number of shillings and pence may be found by adding the decimal equivalents of those numbers. The decimal of 7s. 11d. 3qr. = .35 + .045833 + .003125 = .398958. For most purposes three or four decimal places are sufficient.

| Value of £1.          |        |                      |         | Value of U. S. Money<br>in Sterling at Par.            |                               |
|-----------------------|--------|----------------------|---------|--|-------------------------------|
| At a Premium.         |        | At a Discount.       |         |  |                               |
| Par                   | 4.8665 | Par                  | 4.8665  | 1 cent   | = .493d.                      |
| $\frac{1}{8}$ % prem. | 4.8726 | $\frac{1}{8}$ % dis. | 4.86042 | 25 cents   | = 12.325d.                    |
| $\frac{1}{4}$ "       | 4.8787 | $\frac{1}{4}$ "      | 4.85433 | 100 "  | = 4s. 1 $\frac{1}{2}$ d.      |
| $\frac{3}{8}$ "       | 4.8848 | $\frac{3}{8}$ "      | 4.84825 | 200 "  | = 8s. 2 $\frac{3}{4}$ d.      |
| $\frac{1}{2}$ "       | 4.8909 | $\frac{1}{2}$ "      | 4.84217 | 300 "  | = 12s. 4d.                    |
| $\frac{5}{8}$ "       | 4.8970 | $\frac{5}{8}$ "      | 4.83609 | 400 "  | = 16s. 5 $\frac{1}{2}$ d.     |
| $\frac{3}{4}$ "       | 4.9030 | $\frac{3}{4}$ "      | 4.83000 | 500 "  | = £1 0s. 6 $\frac{3}{4}$ d.   |
| $\frac{7}{8}$ "       | 4.9091 | $\frac{7}{8}$ "      | 4.82392 | 600 "  | = £1 4s. 8d.                  |
| 1 "                   | 4.9152 | 1 "                  | 4.81783 | 700 "  | = £1 8s. 9 $\frac{1}{2}$ d.   |
| 2 "                   | 4.9639 | 2 "                  | 4.76917 | 800 "  | = £1 12s. 10 $\frac{3}{4}$ d. |
| 3 "                   | 5.0126 | 3 "                  | 4.72051 | 900 "  | = £1 17s. 0d.                 |
| 4 "                   | 5.0612 | 4 "                  | 4.67184 | 1000 "   | = £2 1s. 1 $\frac{1}{2}$ d.   |
| 5 "                   | 5.099  | 5 "                  | 4.62317 | <i>London Stock Exchange<br/>quotations, \$1 = 4s.</i> |                               |

By taking multiples of the above numbers, the value of any sum in pounds, or dollars, can easily be obtained. For £10, move the decimal point one space to the right, for £100, two places, and so on.

### IMPORTERS' ADVANCE TABLE.

Showing the Value of Sterling Money at Par,  
and with from 5 % to 50 % added.

| Invoice Price. | Par.                        | 5.   | 10.  | 12 $\frac{1}{2}$ . | 15.  | 20.  | 25.  | 30.  | 33 $\frac{1}{3}$ . | 40.  | 50.  |
|----------------|-----------------------------|------|------|--------------------|------|------|------|------|--------------------|------|------|
| 1d.            | .02 $\frac{11}{16}$<br>4800 | .02  | .02  | .02                | .02  | .02  | .02  | .03  | .03                | .03  | .03  |
| 2d.            | .04                         | .04  | .04  | .04                | .05  | .04  | .05  | .05  | .05                | .06  | .06  |
| 3d.            | .06                         | .06  | .07  | .07                | .07  | .07  | .08  | .08  | .08                | .08  | .09  |
| 4d.            | .08                         | .08  | .09  | .09                | .09  | .10  | .10  | .10  | .11                | .11  | .12  |
| 5d.            | .10                         | .11  | .11  | .11                | .12  | .12  | .13  | .13  | .13                | .14  | .15  |
| 6d.            | .12                         | .13  | .13  | .13                | .14  | .14  | .15  | .16  | .16                | .17  | .18  |
| 1s.            | .24 $\frac{1}{2}$           | .25  | .26  | .27                | .28  | .29  | .30  | .31  | .32                | .34  | .37  |
| 2s.            | .48 $\frac{1}{2}$           | .51  | .53  | .55                | .56  | .58  | .61  | .63  | .65                | .68  | .73  |
| 3s.            | .73                         | .77  | .80  | .82                | .83  | .88  | .91  | .92  | .97                | 1.02 | 1.09 |
| 4s.            | .97                         | 1.02 | 1.07 | 1.09               | 1.12 | 1.16 | 1.22 | 1.26 | 1.29               | 1.36 | 1.45 |
| 5s.            | 1.21                        | 1.27 | 1.33 | 1.36               | 1.39 | 1.44 | 1.51 | 1.57 | 1.61               | 1.69 | 1.87 |

**Explanation.**—After finding what proportion the charges are of the total purchase price of the goods, look in the table under the rate. Combine or multiply when the invoice price is more than that given in the table.

## London Course of Exchange.

289. London has been called the great clearing-house of the world. Nearly all the foreign trade of the United States is settled through England and France.

## LONDON RECEIVES FROM, OR GIVES TO,

Variable, according to the exchanges,

|                   |                                   |  |
|-------------------|-----------------------------------|--|
| Amsterdam .....   | 12 florins and 3 stivers.....     | for £1 sterling.                             |
| Antwerp.....      | 25 francs, 20 centimes.....       | " " "  |
| Bremen.....       | 1 mark.....                       | " 1s. "                                      |
| Berlin .....      | 1 " .....                         | " " "  |
| Christiania ..... | 4 specie-daler, 30 skilling.....  | " £1 "                                       |
| Constantinople..  | 140 piastres .....                | " " "  |
| Copenhagen .....  | 9 rigsbank daler, 10 skilling...  | " " "  |
| Frankfort.....    | 1 mark .....                      | " 1s. "                                      |
| Genoa.....        | 25 lire, 35 centesimi.....        | " £1 "                                       |
| Greece .....      | 25 drachma, 20 leptas.....        | " " "  |
| Hamburg.....      | 20 marks, 45 pfennige.....        | " " "  |
| Milan.....        | 25 lire, 40 cents.....            | " " "  |
| Naples.....       | 25 " 20 " .....                   | " " "  |
| Leghorn.....      | 25 " 50 " .....                   | " " "  |
| Paris.....        | 25 francs, 20 centimes.....       | " " "  |
| Rome.....         | 25 lire, 20 " .....               | " " "  |
| Stockholm.....    | 12 dalers in banco, 1 skilling... | " " "  |
| Switzerland.....  | 25 francs, 20 centimes.....       | " " "  |
| Venice.....       | 25 lire, 20 cents .....           | " " "  |
| Vienna.....       | 13 florins, 70 kreuzers.....      | " " "  |
| Calcutta.....     | 23 pence sterling.....            | " 1 Com. rupee.                              |
| Gibraltar .....   | 48½ " " .....                     | " 1 duro, or hard dollar, or Spanish dollar. |
| Lisbon .....      | 53½ " " .....                     | for 1 milreis.                               |
| Madrid.....       | 50½ " " .....                     | " 1 hard dollar.                             |
| New York.....     | 49½ " " .....                     | " 1 U. S. dollar.                            |
| Palermo .....     | 119½ " " .....                    | " 1 onza.                                    |
| Pekin.....        | 72 " " .....                      | " a thousand cash.                           |
| Rio Janeiro.....  | 30 " " .....                      | " 1 milreis.                                 |
| St. Petersburg... | 38½ " " .....                     | " 1 silver rouble.                           |

See, also, SYNOPSIS OF MONEYS OF ACCOUNT, page 91.

## EXCHANGE ON FRANCE.

1 Franc = 100 Centimes.

**290.** The intrinsic par value of the Franc in United States money is 19.3 cents, and the rate at which duties are estimated at the Custom-Houses. In exchange quotations the rate is given in the number of francs to the dollar,  $\$1.00 \div .193 = 5.181+$ , the real par of exchange. When more than 5.18 francs are required for a dollar, exchange on France is below par, and when less are required, it is above.

**291.** To find the value of Francs in U. S. money.

*Rule.*—When the rate is given as at the Custom-House, multiply the given amount in francs by 19.3; the product will be in cents.

When the rate is given as in exchange quotations, divide the given amount by the rate.

1. What is the difference in United States money on an invoice of 3885 francs, between the Custom-House value and the exchange rate at 5.18?

$$3885 \div 5.18 = 750.000$$

$$3885 \times 19.3 = 749.805$$

$$.195 \quad \text{Ans. } 19\frac{1}{2} \text{ cts.}$$

2. Find the cost of a bill of exchange on Paris for 6384.25 francs at 5.20, and at Custom-House value.

3. A merchant wishes to remit a bill on Paris in payment of an invoice costing 2126.75 francs, exchange at 5.22½. What must he pay for the bill?

**292.** To find the value of U. S. money in Francs.

*Rule.*—Multiply the amount given in dollars by the exchange rate.

1. What is the face of a bill on Paris which can be purchased for \$470, exchange at 5.20? For \$1285 @ 5.22½? For \$68.25 @ 5.25? For \$1740 @ 5.15?

2. What is the difference between the Custom-House value per franc, and exchange at fr. 5.19 per dollar, on a bill for 58,000 francs? On a bill of 14,500 francs? On 79,680 frs.?



## EXCHANGE ON GERMANY.

1 Reichsmark = 100 pfennige.

293. Since 1874 the Reichsmark, or Mark, as it is generally named, has been the unit of account. Its par value is estimated at the United States Mint to be 23.8 cents, and is so valued at the Custom-House. The exchange quotations are for four marks, the par value of which is 95.2 cents.

## 294. To find the value of Reichsmarks.

*Rule.*—When the rate is given as at the Custom-House, multiply the given amount by 23.8; the product will be in cents.

When the rate is given as in exchange quotations, multiply the given amount by the rate, and divide the product by 4, or divide the rate or the amount by 4 before multiplying.

1. What is the value of an Invoice of 200 marks, estimated at the Custom-House?

$$200 \times 23.8 = 47.600. \quad \text{Ans. } \$47.60.$$

2. What is the value of 200 marks, exchange at 96?

|   |               |  |  |
|---|---------------|--|--|
| $\begin{array}{r} 200 \\ 96 \\ \hline 4 \overline{)19200} \\ 48.00 \end{array}$ | $96 \div 4 =$ | $\begin{array}{r} 200 \\ 24 \\ \hline 48.00 \end{array}$ | $200 \div 4 = 50$<br>$\begin{array}{r} 96 \\ \hline \text{Ans. } 4800 \end{array}$ |
|---|---------------|--|--|

## 295. To find the value of U. S. money in Reichsmarks.

*Rule.*—Divide the given amount by the rate, and when it is given in exchange quotations multiply the product by 4. Or,

Divide the rate, or multiply the amount, by 4 before dividing by the rate. The answer will be in Reichsmarks.

1. What is the face of a draft on Hamburg purchased for \$5783.40, exchange at 94½, and how much would an invoice of the same amount be valued at the Custom-House?

$$94.5)5783.40(6120$$

$$\begin{array}{r} 4 \\ \hline 24480 \text{ marks.} \end{array}$$

$$94.5 \div 4 = .23625)5783.40(24480 \text{ Draft.}$$

$$5783.40 \div 23.8 = 24300 \text{ marks, Custom-House.}$$

Find the face of a draft to cost

- |                     |                  |
|---------------------|------------------|
| 2. \$2057.34 @ 94½. | 4. \$6048 @ 94½. |
| 3. \$169.40 @ 93.   | 5. \$2140 @ 96.  |

Find the value of a bill for

- |                       |                          |
|-----------------------|--------------------------|
| 6. 1200 marks @ 97.   | 8. 16420 marks @ 97½.    |
| 7. 25700 marks @ 93½. | 9. 32675.50 marks @ 95½. |

10. What is the value of an Invoice of 745,750 marks at the Custom-House, and the face of a bill to be remitted in payment, exchange at 95½?

11. The cost of a bill on Bremen for 1280 marks was \$308.77. What was the rate for 4 marks?

#### EXCHANGE ON THE NETHERLANDS.

Guilder or Florin = 100 Centimes.

296. Intrinsic par, or Custom-House value, 1 Florin = 40½ cents.

1. What will a draft on Amsterdam for 1200 guilders cost at 39½?

$$1200 \times 39\frac{1}{2} = \$474.00$$

2. What is the face of a bill on Amsterdam that can be purchased for \$1836, exchange at 40?

$$\$1836 \div .40 = 4590 \text{ guilders.}$$

3. What is the value of an Invoice entered at the Custom-House for 3540.50 florins?

4. A bill for 7200 guilders cost \$336.15. What was the rate?

#### CUSTOM-HOUSE BUSINESS.

297. Custom-Houses are houses or offices established by government for the collection of duties on commodities entered for importation or exportation, where bounties and drawbacks upon such importations or exportations are paid or received, and where vessels are entered and cleared, etc.

298. Ports of Entry are places at which custom-houses are established; and it is lawful to introduce merchandise into a country only at these places.

299. Vessels arriving at any port of the United States must

report at the Custom-House within twenty-four hours after their arrival, and within forty-eight hours must enter, or make a further report, which shall contain all the particulars required to be inserted in a manifest.

**300.** Manifests, or invoices, must be produced, containing particulars of goods, with their cost in the currency of the country from whence imported. When no invoice has been received, and the owner or consignee has testified under oath that such is the case, the goods are entered by appraisement. When the value exceeds \$100, permission must first be obtained from the Secretary of the Treasury to enter in this manner. If the invoice or entry does not contain the right gauge or measurement of the goods, they must be weighed, gauged, or measured at the expense of the importer. When the value of the foreign currency is not fixed by any law of the United States, the invoice must be accompanied by a consular certificate, showing its value in specie, or United States dollars ; and in default thereof, a bond for the production of such certificate will be required.

**301.** **A Tariff** is a list or schedule of goods, with the different rates of duties prescribed by law.

**302.** **Specific Duty** is rated at a specified amount upon each article, ton, yard, lb., etc., without regard to its value.

**303.** **Ad Valorem Duty** is rated at a certain per cent. upon the cost of the goods in the country from which they were imported.

**304.** On some goods both a specific duty and an ad valorem duty are charged.

**305.** The ton in all cases is taken at 2240 lbs. In weights and currencies, less than one-half a pound or one-half a dollar is disregarded ; more than one-half is taken as one.

For the value of Foreign moneys, see Table issued by the Secretary of the Treasury, on page 90. For all currencies not in the Table a consular certificate is required.

**306.** In estimating specific duties, certain allowances are made for the package, waste, or damages, as it is the design of the government to tax only so much of the goods as may actually arrive and be available in the market.

**307.** The value on which duties are charged is the actual

cost or general market value of the goods in the country from whence imported, including commissions, cost of transportation, with all the expenses included to the vessel in which shipment is made to the United States, the value of box or covering, brokerage, export duty, and all other actual or usual charges incidental to shipment.

**308. Tare** is the allowance made for the weight of the package containing the goods, in the manner prescribed by law. In some cases it is reckoned at so much per package, sometimes at a certain percentage, and sometimes by actual weight or measurement. A Table of Tares on certain articles was fixed by Act of Congress in 1862; on all other articles only the actual tare is allowed, or that expressed in the invoice, if the collector and consignee so agree.

**309. Draft** is the allowance made for waste or impurities.

**310. Leakage** is an allowance made for waste on liquids. **Breakage** is an allowance on liquors imported in bottles.

**311. Gross Weight** is the entire weight of goods and packages combined.

**312. Net Weight** is the weight after all allowances have been deducted.

**313. Tonnage** is the amount paid per ton on the vessel for permission to enter port.

**314. Warehousing** is the placing of goods in public store, or bonded warehouse, in charge of the government, when the importer does not wish to withdraw the goods or pay the duties immediately. All goods so deposited must be withdrawn, or the duties thereon paid, within one year; and all goods remaining beyond three years are regarded as abandoned to the government, and sold under regulations prescribed by the Secretary of the Treasury.

**315. A Custom-House Broker** is one who attends to making the proper entries of goods at the Custom-House, for merchants. As there is a great variety of points involving special questions for each separate invoice, style of merchandise, and form of entry, the services of a responsible custom-house broker will materially aid those who are inexperienced.

**Note.**—For valuation of currencies, see EXCHANGE and page 90.

1. Imported 25 bags canary-seed, weighing 5955 lbs., the tare of which was 75 lbs., and paid duty of \$1 per bushel of 60 lbs. How much did I pay?

2. What was the duty on 3150 gals. molasses, leakage 5%, at 15 cents per gallon?

3. What was the duty on an invoice of broadcloth valued at £300 10s. 6d., rate of duty 30%?

4. What is the duty on an invoice valued at 5427 marks, at 40% ad valorem?

5. Paid duties, at 35% ad valorem, on goods imported from France, valued at fr. 7325.25. How much did I pay?

6. Imported from England, per brig Wellington, 24 sacks wool, weighing 2560 lbs., invoiced at 1s. 3d. per lb. How much duty did I pay, the rate being 10 cents per lb. and 11 per cent. ad valorem? 3% tare allowed. *Ans.* \$333.95.

7. H. J. Claffin & Co. imported 10 cases white muslins, 2055 ps. of 20 yds. each, 1½ yds. wide, on which they paid duties at 4½ cts. per square yard. The goods cost 2½d. pr. yard, and the charges in Manchester amounted to £49 16s. 6d. If they remitted bills of exchange purchased at \$4.88, what was the total cost? *Ans.* Duties, \$2183.44; total cost, \$4515.84.

8. Morse, Shepard & Co. received per "Aurora," from Paris, 5 cases shawls, weighing 1123 lbs., and invoiced at fr. 12,225, on which they paid duties at 22 cts. per lb. and 35% ad valorem. How much were the duties, and how much did a bill of exchange on Paris to pay for the invoice cost, if purchased at fr. 5.08?

*Ans.* Duties, \$1072.86; Bill of Exch., \$2406.50.

9. Imported 1 case shawls, weighing 220 lbs., which cost £110 10s., and paid as duty 40 cts. per lb. and 35% ad valorem; 2 cases white muslin, containing 6845 yds., and costing £105 15s., the duty on which was 3 cts. per square yard. How much did the goods cost me, duties included, if I paid the merchant in bills of exchange purchased at \$4.89½?

What is the duty to be paid on the following invoice, at the rate of 35 % ad valorem and 50 cents per lb. specific duty?

*Invoice of Merchandise purchased by BELL & Co. for account and risk of CADE, BROTHERS & Co., Philadelphia, forwarded to Liverpool for shipment per steamer "Persia."*

*Huddersfield, Eng., 10th Dec., 1882.*

|                    |  |     |         |     |      |      |      |    |    |  |
|--------------------|--|-----|---------|-----|------|------|------|----|----|--|
| D<br>◇<br>P<br>547 | 7 pieces 56 inch Fancy Coatings<br>(all wool). |     |         |     | yds. |      |      |    |    |  |
|                    | #1128  | 46½ | #1136   | 43½ |      |      |      |    |    |  |
|                    | 1130   | 45  | 1138    | 45½ |      |      |      |    |    |  |
|                    | 1131   | 46½ | 1161    | 46½ | 319½ |      |      |    |    |  |
|                    | 1137   | 45½ | damage, |     | 1½   |      |      |    |    |  |
|                    | Deduct ⅓ overmeasure,                          |     |         |     | 317¾ |      |      |    |    |  |
|                    |  |     |         |     | 8½   |      |      |    |    |  |
|                    | 7 ps. making up,                               |     |         |     | 309½ | 11/3 | 173  | 19 | 1  |  |
|                    | Sample Card, 3/-, Case, 23/-, Carriage, 5/6,   |     |         |     |      | .6d  |      | 3  | 6  |  |
|                    |  |     |         |     |      |      | 1    | 11 | 6  |  |
|                    | Commission, 2½ per cent.                       |     |         |     |      |      | 175  | 14 | 1  |  |
|                    |  |     |         |     |      |      | 4    | 7  | 10 |  |
|                    | 2½ per cent. discount on £173. 19. 1.,         |     |         |     |      |      | 180  | 1  | 11 |  |
|                    |  |     |         |     |      |      | 4    | 6  | 11 |  |
|                    | Consul's certificate,                          |     |         |     |      |      | 175  | 15 | 0  |  |
|                    |  |     |         |     |      |      |      | 10 | 4  |  |
|                    | Gross Weight, 654 lbs.                         |     |         |     |      |      | £176 | 5  | 4  |  |
|                    | Net " 539 "                                    |     |         |     |      |      |      |    |    |  |
|                    | Cash, Dec. 10, 1882.                           |     |         |     |      |      |      |    |    |  |

*Extract from Bill of Lading.*

D 547

◇ P

Feet. In.

35 — 3 @ 45/- per ton, £1. 9. 8

Primage, 1. 11

£1. 11. 7

Shipped by WESTON & Co., on "Persia," from Liverpool to New York, one Case, marked as pr. margin, and consigned to CADE, Bros. & Co., Philadelphia.

*Liverpool, 13th Dec. /82.*

**Note.**—The ton is a ton measurement, 40 cubic feet; the Case is 35½ cubic feet.  $\frac{35½}{40}$  of 45 shillings = £1. 9. 8. for freight.

*Shipping Charges.*

Charges on Case  $\begin{smallmatrix} D \\ \diamond \\ P \end{smallmatrix}$  547, shipped by WESTON & Co., pr. "Persia" for New York, consigned to CADE, BROS. & Co., by order of BELL & Co., Huddersfield.

|                                      |             |
|--------------------------------------|-------------|
| Dues and entry at Customs, . . . . . | 1. 11       |
| Bills of Lading, . . . . .           | 1. 6        |
| Cartage, . . . . .                   | 2. 9        |
| Commission, . . . . .                | 2. 6        |
|                                      | <u>8. 8</u> |

*Liverpool, 13th Dec., 182.*

*Duty.*

|  |                   |
|--|-------------------|
| Invoice Value, . . . . .                   | £176. 5. 4        |
| Deduct Consul fee, not dutiable, . . . . . | 10. 4             |
|  | <u>175. 15. 0</u> |
| Liverpool charges, . . . . .               | 8. 8              |
|  | <u>£176. 3. 8</u> |

*Woollens.*

|  |                             |
|--|-----------------------------|
| £176. 3. 8., at \$4.8665, = \$85.7, duty 35 per cent., . . . . . | \$300.06                    |
| lbs.—539, " 50 cts. . . . .                                      | 269.50                      |
|  | <u>Duty, . . . \$569.56</u> |

10. R. W. Anston & Co. imported an invoice of gloves from Amsterdam, valued at 3972 guilders, and paid a duty of 45%. How much did they pay?

11. A mercantile house imported the following invoices, and paid duties as annexed. What was the duty on each invoice, and the total paid?

|                                |                              |
|--------------------------------|------------------------------|
| £1262 10s. 6d. @ 25%. . . . .  | 1865.50 marks @ 60%. . . . . |
| 4648.25 francs " 40%. . . . .  | 2400 florins " 35%. . . . .  |
| 1650 reichmarks " 65%. . . . . | £718 9s. 6d. " 30%. . . . .  |

12. Imported and paid duties on the following goods: 1 case 1245 yds., costing £212 14s. 6d., duty 20% ad valorem, and 5 cents specific duty per yard; 1 case silk, weight 145 lbs., value of invoice 6462 francs, duty 30% ad valorem, and 10 cents per pound; 100 lace shawls, invoice costing 16,320 marks, duty 35%. What was the duty on each invoice, and its entire cost at custom-house valuation?

## PROFIT AND LOSS.

**316.** The difference between the cost of an article and the amount received for it is the gain or loss.

**317.** The cost of goods consists of the price paid to the person from whom they were purchased, or the expense of producing them, and all charges, such as commissions, freight, packing, duties, exchange, insurance, drayage, etc., necessary to place the goods in a condition ready for use or sale.

### Total Gains and Losses.

**318.** The total gains or losses on goods may be easily ascertained, when all are sold, by taking the difference between the cost and selling price; but when part remains unsold—

*Rule I.—Add the value of the merchandise unsold to the amount received for sales, and take the difference between the sum thus obtained and the cost of the merchandise; the difference will be the gain or loss. Or,*

*Rule II.—Find the difference between the amount of sales and the cost of the merchandise; then—*

**319.** When there is an excess of Cost over Sales—

*If the value of the goods remaining unsold is more than this excess, the difference is a gain.*

*If the value of the goods is less, the difference is a loss.*

**320.** When the Sales exceed the Cost—

*Add the value of the goods unsold to the difference between the SALES and the COST; the result will be the gain.*

**321.** In estimating the value of goods remaining unsold, when an "account of stock" is taken, it is customary to use the invoice or purchase price; but if the market value of the goods has depreciated, either from the nature of the goods or the state of the market, or if there has been a decided advance in prices, an allowance must be made accordingly. A safe rule is, if they are salable goods, to estimate them at what it would cost to replace them.

In solving the questions in Profit and Loss, the principles of percentage are applied. The Cost is the Base, the Rate per cent. of gain or loss the Rate, the Selling Price plus the gain is the Amount, and the Selling Price minus the loss is the Difference.



Gains and Losses on Particular Goods.

322. *Case I.*—To find the gain or loss, when the cost and rate per cent. are given.

*Rule.*—Multiply the cost by the rate per cent., and divide by 100.

Cost  $\times$  Rate (expressed decimally) = Gain or Loss.

*Note.*—The selling price is found by adding the gain to the cost, or deducting the loss; or multiplying the cost by  $100 +$  the rate, or  $100 -$  the rate.

EXAMPLES.

1. Bought broadcloth for \$250, and sold it at 15% advance. How much did I gain?

$$250 \times 15 = 3750. \quad \$37.50, \text{ Ans.}$$

2. How much do I gain per barrel, if I sell flour which cost \$11 per bbl. at a profit of 25%? *Ans.* \$2.75.

3. Bought a cargo of wheat for \$11,500, and sold it at a profit of  $16\frac{1}{2}\%$ . How much did I gain?

4. A merchant purchased a quantity of lumber for \$2200. He paid for freight and drayage, \$75; commission for selling, \$125. He gained 27% on the entire cost. How much was it sold for, and how much did he make?

5. What difference will it make in the cost per yard to the American merchant who buys his goods in England for \$4 per yard, and pays a duty of 30% on them, if the price in England is reduced to \$3 per yard?

EXAMPLES.

1. What is the selling price of the following goods at 25% above the given price? [11.]

5 gross steel pens,  $\text{gr. } \frac{1}{.60}, \frac{2}{\$1.00}, \frac{2}{\$1.20}$ . (See ABBREVIATIONS, p.

20 diamond satin bonnets, @ 30c.

50 doz. tassels, @ \$1.50 per doz.

1 case, 12 pairs men's calf sewed boots, @ \$4.

3 " 60 " misses' lasting gaiter boots, @ \$1.40.

8 ps. mousseline de laine, 240 yds., @ 60c.

12 doz. bl'k Italian cravats, @  $\text{doz. } \frac{3}{\$12}, \frac{2}{\$15}, \frac{7}{\$16}$ .

The following special rules are sometimes used with advantage:

**323. To find the selling price to gain 25% profit.**

*Rule.*—Annex a cipher to the cost price and divide by 8.

1. Purchased cloth at \$3.60 per yard. What must I sell it for to gain 25%?

$$3600 \div 8 = 450. \quad \text{Ans. } \$4.50.$$

2. Sold goods at 25% profit which cost \$1.20. What was the selling price?

3. A firm invested \$72,640 as capital, on which they gained 25%. How much did they gain?

**324. To find the selling price at 20% profit.**

*Rule.*—Multiply the cost price by 12, and point off ONE decimal from the right.

1. For how much should tea be sold that cost 80 cts. per pound to gain 20% profit?

$$80 \times 12 = 960. \quad \text{Ans. 96 cents.}$$

**325. To find the selling price of a single article at 20% profit, when the cost price per dozen is given.**

*Rule.*—Point off ONE decimal from the right.

1. At what price must handkerchiefs which cost \$2.50 per doz. be sold singly to gain 20%?

$$2.50 = 250 \text{ cents, } 25.0 \quad \text{Ans. 25 cents.}$$

2. Purchased 3 doz. qts. ink at \$6 per dozen. To gain 20%, what must the selling price be per quart?

3. To gain 20%, what must be the selling price of articles that cost \$8 per dozen? \$12.50 per dozen? 95 cents per dozen? \$14.25 per dozen?

**326. To find the selling price to gain 30% on articles sold singly.**

*Rule.*—Add  $\frac{1}{10}$  to the cost per doz. and point off ONE decimal. For  $33\frac{1}{3}\%$  add  $\frac{1}{9}$ . For 40% add  $\frac{1}{6}$ . For 55% add  $\frac{1}{4}$ , in each case pointing off ONE decimal from the right.

**327. Case II.**—To find the rate per cent., when the gain or loss, or cost and selling price, are given.

*Rule.*—Multiply the gain or loss by 100, and divide the product by the cost.

$$\text{Gain or Loss} \times 100 \div \text{Cost} = \text{Rate.}$$

EXAMPLES.

1. Sold a house for \$7995, which cost me \$6500. What per cent. did I gain?

$$\begin{aligned} 7995 - 6500 &= 1495 & 1495 \times 100 &= 149500 \\ 149500 \div 6500 &= 23. & \text{Ans. } 23\%. \end{aligned}$$

2. Bought a cargo of flour for \$18,000, and sold it for \$20,000. What per cent. did I gain?

3. If by a decline of prices I was obliged to sell a lot of coffee for \$2200 which cost me \$2500, what per cent. did I lose?

4. A merchant bought a quantity of silks at \$2.50 per yard, and sold them at \$2.87½. What per cent. did he make?

**328. Case III.**—To ascertain the cost, when the selling price and rate per cent. gained or lost are given.

*Rule.*—Multiply the selling price by 100, and divide the product by 100 increased by the gain per cent. or diminished by the loss per cent.

$$\text{Selling Price} \times 100 \div \left\{ \begin{array}{l} 100 + \text{Gain per cent.} \\ 100 - \text{Loss} \end{array} \right\} = \text{Cost.}$$

EXAMPLES.

1. An invoice of goods purchased in England was sold for \$3600, realizing a gain of 20%. What was the cost?

$$\begin{aligned} 100 + 20 &= 120 & 360000 \div 120 &= 3000 \\ \text{Ans. } \$3000. \end{aligned}$$

2. A merchant sold sugar for \$1260, by which he lost 10%. What was the cost?

$$\begin{aligned} 100 - 10 &= 90 & 126000 \div 90 &= 1400 \\ \text{Ans. } \$1400. \end{aligned}$$

**329. Case IV.**—To find the cost, when the gain or loss and the rate per cent. are given.

*Rule.*—Multiply the gain or loss by 100, and divide the product by the rate per cent.

$$\text{Gain or Loss} \times 100 \div \text{Rate} = \text{Cost.}$$

**EXAMPLES.**

1. I gained \$2250 by selling goods at a profit of 15%. What did they cost?

$$225000 \div 15 = 15000. \quad \text{Ans. } \$15000.$$

2. How large sales must I make, at a profit of  $12\frac{1}{2}$  per cent., to clear \$3000? Ans. \$24000.

3. Sold flour at an advance of 20%, and gained \$136. What did it cost?

4. Sold tea and gained 9 cents per pound, which was a profit of 20%. What was the cost?

5. If I sell cloth at 50% profit, and thereby gain \$1.25, what was the cost?

**330.** To find what the gain or loss per cent. would be if sold at another price, the selling price and rate per cent. of gain or loss being given.

*Rule.*—Multiply the proposed selling price by 100, increased by the given rate per cent. of gain, or diminished by the given per cent. of loss, and divide the product by the actual selling price, and take the difference between the quotient and 100.

$$\frac{\text{Proposed Selling Price} \times \left\{ \begin{array}{l} 100 + \text{Gain} \\ 100 - \text{Loss} \end{array} \right\}}{\text{Actual Selling Price}} = \begin{array}{l} \text{Amt.} \\ \text{Diff.} \end{array}$$

**EXAMPLES.**

1. If by selling cloth at \$5 per yard I gain 25%, what per cent. will I gain if I sell it at \$6 per yard?

$$\begin{array}{l} 100 + 25 = 125 \quad 125 \times 6 = 750 \\ 750 \div 5 = 150 \quad 150 - 100 = 50. \quad \text{Ans. } 50\%. \end{array}$$

2. Sold flour for \$10, and lost 20%. What per cent. would I have lost if I had sold it for \$8? Ans. 36%.

## PREMIUM AND DISCOUNT.

**331.** **Premium** is the percentage by which an amount is increased. **Discount**, the percentage by which an amount is diminished.

**332.** In purchasing one currency with another of different value, the discount on that of the highest value is not the same as the premium on that of the lowest at the same rate. \$100 in currency, at a discount of 5%, is worth \$95 in gold. \$95 in gold, at a premium of 5%, is worth  $95 + 4.75 = 99.75$ .

**333.** Merchants are usually allowed discounts on invoices and bills purchased on credit, for cash payments within a specified time. The discount is allowed on the amount of the bill or invoice; but often, when part is paid, the discount is calculated on the cash payment, instead of on the proportion of the bill settled, which causes a loss to the purchaser. If an invoice costs \$2500, and \$1900 is paid, at 5% discount it will cancel \$2000, thus saving to the purchaser \$100; but if the 5% is calculated on \$1900, the amount paid, the payment will cancel only \$1995, making a difference of \$5 between the two methods.

**334.** To find what amount is settled when part only is paid, a discount on sales being allowed for prompt payment.

*Rule.*—Annex two ciphers to the cash payment, and divide by 100, less the rate per cent. of discount.

$$100 - 5 = 95 \quad 190000 \div 95 = 2000. \quad \text{Ans. } \$2000.$$

**By Analysis.**—If 5% discount is allowed, \$95 will pay a bill of \$100, and \$1900 will pay as many hundreds as 95 is contained times in it, = 2000, the answer.

The difference between 5% on the amount of invoice and 5% on the amount of cash paid equals 25 cents for every \$100 of the invoice; at 6%, the difference equals 36 cts.; at 3%, 9 cts.

## DISCOUNTING BILLS AND INVOICES.

**335.** In discounting Bills and Invoices, losses sometimes occur when they are not suspected. If an article is sold at a profit of 40%, and 10% be deducted from the selling price, the

## 192 DISCOUNTING BILLS AND INVOICES.

gain is not 30%, but 26%, because the discount is calculated on the first cost and also on the profit, whereas the profit is calculated on the first cost only. So, also, if 40% be added, and then 30% deducted, the apparent profit is 10%, but the *real* loss is 2%.

|                              |              |                                 |               |
|------------------------------|--------------|---------------------------------|---------------|
| <i>Cost,</i>                 | <i>\$200</i> | <i>Cost,</i>                    | <i>\$1.00</i> |
| <i>40 per cent,</i>          | <i>80</i>    | <i>40 per cent.,</i>            | <i>.40</i>    |
| <i>Advanced price,</i>       | <i>280</i>   | <i>Advanced price,</i>          | <i>1.40</i>   |
| <i>Less 10 per cent.,</i>    | <i>28</i>    | <i>Less 30 per cent.,</i>       | <i>.42</i>    |
| <i>Cash price,</i>           | <i>252</i>   | <i>Cash price,</i>              | <i>.98</i>    |
| <i>26 per cent. profit.</i>  |              | <i>2 per cent. loss.</i>        |               |
| <i>10 per cent. of \$200</i> |              | <i>30 per cent. of \$1.00</i>   |               |
| <i>(cost) = \$20</i>         |              | <i>(cost) = .30</i>             |               |
| <i>10 per cent. of \$80</i>  |              | <i>30 per cent. of .40</i>      |               |
| <i>(profit) = 8</i>          |              | <i>(profit) .12</i>             |               |
|                              | <i>\$28</i>  |                                 | <i>.42</i>    |
| <i>= 14 per ct. of cost.</i> |              | <i>or 42 per cent. of cost.</i> |               |

The following will show what rates of profit must be added to equal the given discounts to be taken off the advanced price :

|  |  |
|--|--|
| <i>10 % Dis. = 11 <math>\frac{1}{9}</math> % Profit.</i> | <i>30 % Dis. = 42 <math>\frac{6}{7}</math> % Profit.</i> |
| <i>16 <math>\frac{2}{3}</math> " = 20 " "</i>            | <i>33 <math>\frac{1}{3}</math> " = 50 " "</i>            |
| <i>20 " = 25 " "</i>                                     | <i>40 " = 66 <math>\frac{2}{3}</math> " "</i>            |
| <i>25 " = 33 <math>\frac{1}{3}</math> " "</i>            | <i>50 " = 100 " "</i>                                    |

Ex. 1.—What is the difference between discounting a bill of \$1200 at 40%, taking a discount off the remainder of 5% for cash payment, and discounting the whole bill at 45%?

Ex. 2.—If a merchant buys a book at a discount of 20% on the retail price, and sells it at the retail price, what per cent. on the purchase-price does he gain? What per cent. does he gain if he buys at 33 $\frac{1}{3}$  % discount and sells it at the retail price?

336. To find the price from which a given rate per cent. may be deducted and a required price will be left.

*Rule.*—Divide the required price by 100% expressed decimally, diminished by the given rate per cent. to be deducted.

$$\frac{\text{Required Price}}{\text{Price}} \div \left\{ 100\% - \begin{array}{c} \text{Rate per cent.} \\ \text{of discount} \end{array} \right\} = \text{Price to be discounted.}$$

## EXAMPLES.

1. Bought goods for \$100: for how much shall I sell them that I may deduct 20% and yet obtain what they cost?

$$100 \div .80 = 125. \quad \text{Ans. } \$125.$$

2. For what must I sell goods worth \$100, so that I may deduct 45% and yet gain 30%?

$$\begin{array}{rcl} 100 + 30 = 130 & 100 - 45 = 55 & \\ 130 \div .55 = 236.36. & & \text{Ans. } \$236.36. \end{array}$$

*Note.*—236.36 = 136.36% advance on 100. When a long list is to be made out at a uniform rate of profit, labor may be saved by adding the total advance at once.

3. If I buy cloth at \$1.90 per yard, at what price must I mark it, that I may deduct 5% for my cash customers from the marked price, and yet gain 20%? Ans. \$2.40.

4. A bookseller wishes to increase the price of a book which he now sells for \$2, so that he can deduct 20% and yet receive the present price. What must be the advanced price?

5. A dry-goods merchant sells cloths for \$168, by which he gains 20%. What must be the advanced price so that he can deduct 5% and still make the same profit?

6. What must be the price from which 20% may be deducted and leave 40 cts.?

7. Bought cassimeres for \$1.20 per yard: at what price must they be sold that 5% may be deducted for cash payment and leave a profit of 25%?

8. Find the selling price of French plate glass that cost \$60 per light, from which 45% may be deducted and 30% gained on cost.

# 194 DISCOUNTING BILLS AND INVOICES.

What is the selling price of the goods in the following invoice, so that 25% may be gained on the prices given, and yet allow a discount of 5% for cash payment?

*Philadelphia, April 20, 1882.*

MR. CHAS. P. GREGORY

*Bo't of J. J. BAILEY & Co.*

|                                       |           |  |
|---------------------------------------|-----------|--|
| 8 doz. long shawls,                   | @ \$60.80 |  |
| 2 pieces sheeting, 30.35 yds.,        | " .15     |  |
| 6 doz. linen hdkfs.,                  | " 3.00    |  |
| 3 pieces twilled muslin, 84 yds.,     | " .20     |  |
| 1 piece mousseline de laine, 32 yds., | " .24     |  |

*Philadelphia, March 12, 1882.*

J. HARRIS BROWN

*Bo't of MYERS & CLAGHORN.*

|  |       |    |
|--|-------|----|
| 240 yds. ingrain carpet, @ \$1.20,     | 288   | 00 |
| Less 5%                                | 14    | 40 |
|  | \$273 | 60 |
| Rec'd payment,                         |       |    |
| MYERS & CLAGHORN,                      |       |    |
| per J. B. JONES.                       |       |    |
| Freight and other expenses to Madison. | 21    | 89 |
|  | \$295 | 49 |

At what must I sell the carpeting per yard to gain 20% and allow a discount of 10% from selling price?

**Solution.**—5% of \$1.20 = 6 cts.  $1.20 - 6 = 1.14$ , net cash price per yard in Philadelphia. Charges, 21.89 = 8% of total cost in Philadelphia. 8% of 1.14 = 9+.  $1.14 + 9 = \$1.23$ , advanced cost per yard.

**Proof.**—240 yds. @ \$1.23 = \$295.20, which, allowing for fractions, is the cost of the invoice.

20% of \$1.23 = 25 cts., nearly; adding this to the cost, we have \$1.48 as the amount to be received. Then, to obtain the selling price,  $100 - 10 = 90$   $148 \div 90 = 1.64+$ . *Ans.* \$1.64 per yd.

**Proof.**—10% of 1.64 = 16+  $1.64 - 16 = 1.48$ .



## PRICE LISTS.

337. Price Lists are made out by manufacturers and dealers, as prices to be charged, subject to the deductions of certain rates per cent., which fluctuate according to the cost of manufacturing, demand for the goods, etc. By changing the rate of discount, the prices are changed without altering the price lists.

## EXTRACT FROM PRICE-LIST OF CLARKSON &amp; CO.,

## MANUFACTURERS AND IMPORTERS OF BRUSHES.

Terms, Net Cash.

PHILADELPHIA.

January 1, 1888.

## Ground Paint Brushes.

## Wire Bound.

|                  |        |
|------------------|--------|
| No. 6, per doz., | \$2.00 |
| " 5, " "         | 2.50   |
| " 4, " "         | 3.00   |
| " 3, " "         | 3.50   |

## Kalsomine Brushes.

|                  |         |
|------------------|---------|
| 5 in., per doz., | \$24.00 |
| 6 in., " "       | 33.00   |
| 7 in., " "       | 42.00   |
| 8 in., " "       | 48.00   |
| 9 in., " "       | 57.00   |

## W. &amp; P. TOWNSEND'S CARRIAGE-BOLT WORKS.

## PRICE LIST PER HUNDRED.

|                                    |        |
|------------------------------------|--------|
| 1 in., $\frac{1}{8}$ in. diameter, | \$2.50 |
| 2 " " " "                          | 3.10   |
| 3 " " " "                          | 3.65   |
| 2 " $\frac{7}{16}$ " "             | 4.55   |
| 3 " " " "                          | 5.25   |
| 2 " $\frac{1}{2}$ " "              | 7.64   |
| 3 " " " "                          | 8.48   |

## Tire Bolts.

|                    |        |
|--------------------|--------|
| $\frac{1}{8}$ in., | \$1.50 |
| $1\frac{1}{2}$ " " | 1.68   |
| $2\frac{3}{4}$ " " | 1.75   |
| $2\frac{5}{8}$ " " | 2.41   |

## Wrought Axle Clips.

|       |    |    |    |    |    |
|-------|----|----|----|----|----|
| Size, | 0. | 1. | 2. | 3. | 4. |
|-------|----|----|----|----|----|

20 per cent. discount to the trade.

Price, \$1.05. 1.05. 1.05. 1.10. 1.20.

If a discount of 20% on the above prices is allowed, leaving a net gain of 10%, what is the cost of manufacture?

Find the selling price of the following goods, so that a discount of 10% may be deducted and leave a gain of 15%.

The prices annexed show the cost.

|   |                              |
|---|------------------------------|
| 100 Amer. Glass, \$1.40 each.               | 50 yards Broadcloth, \$2.40. |
| 100 Tire Bolts, $\frac{5}{16}$ in., \$1.00. | 75 Amer. Cyclopedias, \$60.  |
| 200 yards Muslin, 20 ¢.                     | 80 packs Enam'd Cards, 40 ¢. |
| 100 gross Pens, @ 90 ¢.                     | 25 gross Lead Pencils, \$3.  |
| 25 oz. Carmine Ink, \$2.00.                 | 400 lbs. Letter Paper, 25 ¢. |

*Invoice of Merchandise, marked as in the margin, and forwarded by J. POWERS & Co., Philadelphia, per Penna. R. R., to Messrs. BROWN & GREGG, Chicago, as per their order and at their risk.*

|         |   |                        |                      |
|---------|---|------------------------|----------------------|
| B. & G. | 25 Boxes Valencia Raisins,<br>Gross weight, 710 lbs.<br>Tare, $4\frac{1}{2}$ lbs. per box, $112\frac{1}{2}$ "<br><u>597<math>\frac{1}{2}</math></u> @ 15 cts. | 89                     | 62 $\frac{1}{2}$     |
| B. & G. | 5 Bags Canary Seed,<br>1184 lbs. — 15 lbs. tare = 1169 net,<br>19 $\frac{3}{8}$ bushels @ 4.85,   | 94                     | 49                   |
| B. & G. | 10 Bbls. Currants, 266, 254, 236, 264, 244, 243,<br>260, 260, 260, 243,<br>Total, 2530<br>Tare, 26 lbs. per bbl., 260<br><u>2270</u> @ 18c.                   | 408                    | 60                   |
| B. & G. | 10 Boxes Castile Soap, 406 lbs.<br>Tare, 8 lbs. per box, 80<br><u>326</u> lbs. @ 14c.   | 45                     | 64                   |
| B. & G. | 5 Cases $\frac{1}{2}$ Sardines,<br>500 boxes @ 35c.,<br><br>Cartage, 3.00<br>Ins. on \$900 @ $\frac{1}{2}$ per cent., 4.50<br><u>820</u>                      | 175<br>813<br>7<br>820 | 00<br>35<br>50<br>85 |
|         | Rec'd Payment,<br>J. POWERS & Co.   |                        |                      |

Charges in Chicago :—

|   |              |
|---|--------------|
| Freight on 4050 lbs. @ \$1.10 per h'd., | 44.55        |
| Cartage,                                | 3.00         |
|   | <u>47.55</u> |

Total charges equal 7%, nearly, of first cost of goods.

What must be the selling prices in the above invoice, that I may gain 30%?

SOLUTION.

|                                      |        |          |
|--------------------------------------|--------|----------|
| Total invoice price,                 |        | \$813.35 |
| Charges in Philadelphia,             | \$7.50 |          |
| “ Chicago,                           | 47.55  | 55.05    |
| Total cost,                          |        | \$868.40 |
| $55.05 = 7\%$ , nearly, of \$813.35. |        |          |

|                   | Invoice Price.                          |   | Selling Price. |
|-------------------|---|---|----------------|
| Raisins,          | 15 c. + 7% = 16 c., increased 30% = .21 |   |                |
| Canary Seed, 4.85 | + “ = 5.19                              | “ | = 6.75         |
| Currants, .18     | + “ = .19                               | “ | = .25          |
| Castile Soap, .14 | + “ = .15                               | “ | = .20          |
| Sardines, .35     | + “ = .37                               | “ | = .48          |

PROOF.

|                                       |                  |
|---------------------------------------|------------------|
| 597 $\frac{1}{2}$ lbs. Raisins, @ .21 | = \$125.49       |
| 19 $\frac{29}{60}$ bus. Seed, “ 6.75  | = 131.51         |
| 2270 lbs. Currants, “ .25             | = 567.50         |
| 326 “ Soap, “ .20                     | = 65.20          |
| 500 boxes Sardines, “ .48             | = 240.00         |
|                                       | <u>\$1129.70</u> |
| Total cost,                           | \$868.40         |
| 30% of \$868.40                       | = 260.52         |
|                                       | <u>\$1128.92</u> |
| Allowance for fractions, .78          | \$1129.70        |

The above is given simply as an exercise in calculation. Goods are not generally sold at a uniform rate of profit.

1. If a merchant imports an invoice costing in England £200, and pays for charges, duties, etc., \$50, at what price must he sell an article, the invoice price of which is 8 shillings, so that he can make a profit of 20% on the total cost, exchange at \$4.84 per pound sterling?

2. How much will be the difference on an article costing 60 francs, if duties and other charges are reduced from 70 to 30 per cent., exchange at \$5.18?

Invoice of Queensware shipped by GEORGE HAMMERSLY, Liverpool, Eng., per "Emily Augusta," and consigned to MESSRS. BROWN, EDWARDS & CO., Philadelphia, for their account and at their risk.

| F. & C. |  |      | £.   | s. | d. | £. | s. | d. |
|---------|--|------|------|----|----|----|----|----|
| 15      | 36 Teapots, $1\frac{1}{2}$ $1\frac{1}{2}$ , "Niagara" F. Gold Band, . . . . .                                  | 27/- | 2    | 7  | 3  |    |    |    |
| ◇       | 18 Sugars, 24 "Niagara" F. Gold Band, . . . . .  | "    | 1    | 3  |    |    |    |    |
|         | 18 Creams, 12 " " . . . . .  | 6    |      | 9  |    |    |    |    |
|         | 20 Bowls, 30 " " . . . . .   | 8/-  |      | 5  | 4  |    |    |    |
|         | 14 doz. Teas unhd., " " . . . . .  | 5/-  | 3    | 10 |    |    |    |    |
|         | 27 " Plates, $\frac{1}{2}$ @ 2/-, $\frac{3}{4}$ @ 3/-, $\frac{1}{2}$ @ 3/6, "Niagara" F. Gold Band, . . . . .  |      | 3    | 18 | 6  |    |    |    |
|         | 5 " Dishes, $\frac{1}{2}$ @ 9/-, $\frac{1}{4}$ @ 15/-, $\frac{1}{4}$ @ 21/-, "Niagara" F. Gold Band, . . . . . |      | 3    | 9  |    |    |    |    |
|         | 2 $\frac{1}{2}$ 2 $\frac{1}{2}$  |      |      |    |    |    |    |    |
|         | 5 " Bakers', 7 @ 6/-, 8 @ 9/-, "Niagara" F. Gold Band, . . . . .   |      | 1    | 17 | 6  |    |    |    |
|         | 6 Cover dishes, 92, "Niagara" F. Gold Band, . . . . .  | 2/3  |      | 13 | 6  |    |    |    |
|         | 4 Sauce Tureens Comp., "Niagara" F. Gold Band, . . . . .   | 2/6  |      | 10 |    |    |    |    |
|         | 10 Pickles, "Niagara" F. Gold Band, . . . . .  | 6    |      | 5  |    | 18 | 5  | 4  |
|         | 25 per cent. discount, . . . . .   |      |      |    |    | 4  | 11 | 4  |
|         |  |      |      |    |    | 13 | 14 |    |
|         | Crate and Straw, . . . . .   |      |      |    |    |    | 13 | 6  |
|         | Shipping Charges, . . . . .  |      |      |    |    |    | 9  | 10 |
|         |  |      |      |    |    | 14 | 17 | 4  |
| <hr/>   |  |      |      |    |    |    |    |    |
|         | <i>Fl. In.</i>   |      |      |    |    |    |    |    |
|         | 65 11 Freight 13/-, . . . . .  |      | \$3  | 12 |    |    |    |    |
|         | £14 17s. 4d. at \$4.87 $\frac{1}{2}$ , . . . . .   |      | 72   | 85 |    |    |    |    |
|         | Insurance, 1 $\frac{1}{2}$ per cent. on \$5, . . . . .   |      | 1    | 12 |    |    |    |    |
|         | Duties and Entry, . . . . .  |      | 18   | 70 |    |    |    |    |
|         | Interest from Shipment, . . . . .  |      |      | 54 |    |    |    |    |
|         |  |      | \$96 | 33 |    |    |    |    |

What is the value of a shilling in the above invoice at the advanced cost price? £18 5s. 4d. cost \$96.33.

Find the percentage of the particular charges and of the general charges of the following invoice; and, also, find the percentage to be added to allow a discount of 5% from the selling price and retain a profit of 25%.

*Birmingham, Eng., April 30, 1882.*

*Invoice of Hardware purchased by order and for account and risk of TRUMAN & SHAW, Philadelphia, and forwarded to MESSRS. ALFRED FIELD & Co., Liverpool, for shipment.*

|                       |   | £.                                   | s. | d. |    |    |    |    |
|-----------------------|---|--------------------------------------|----|----|----|----|----|----|
| H. L. H.<br>170<br>F. | 1/2 doz. Jap'd Oval Trays, 10683, 24 in., . . . . .                                 | 13/6                                 | 6  | 9  |    |    |    |    |
|                       | 11/- 8/-  |                                      |    |    |    |    |    |    |
|                       | 1/2 " " " " ea. 10682, 10778, 20 in., . . . . .                                     | 7/3 8/6 10/- 11/6                    | 9  | 6  |    |    |    |    |
|                       | 2 " Oval Trays, 7128, ea. 18, 20, 22, 24, in 1/4 doz., . . . . .                    |                                      | 3  | 14 | 6  | 4  | 10 | 9  |
|                       | Extra pap'g 2 parcels 1/2 d., and 1 @ 8d., . . . . .                                |                                      |    |    |    |    |    | 9  |
|                       | Case, etc., 5/6; Freight to Liverpool, 4/-, . . . . .                               |                                      |    |    |    |    |    | 9  |
|                       |   |                                      |    |    |    | 5  | 1  | 0  |
|                       | 171   |                                      |    |    |    |    |    |    |
|                       | 12 doz. Painted Scale Beams, No. B, 12 in., . . . . .                               | 9/9                                  | 5  | 17 |    |    |    |    |
|                       | 65 per cent. discount, . . . . .  |                                      | 3  | 16 | 1  | 2  | 0  | 11 |
|                       | 10 gro. Tin'd Kettle-Ears, ea. A, B, 0, 1, . . . . .                                | 8/- 9/- 10/6 14/-                    |    |    |    |    |    |    |
|                       | 16/- 20/- 23/6  |                                      | 50 | 10 |    |    |    |    |
|                       | 2, 8, 4, . . . . .  | 77 1/2 per cent. discount, . . . . . | 39 | 2  | 9  | 11 | 7  | 8  |
|                       | Cask, etc., 7/6; Freight to Liverpool, 12/3, . . . . .                              |                                      |    |    |    |    |    | 19 |
|                       |   |                                      |    |    |    |    |    | 9  |
|                       |   |                                      |    |    |    | 14 | 7  | 11 |
|                       | 169   |                                      |    |    |    |    |    |    |
|                       | 4 doz. Brt. Ov. Bake Pans, ea. 1.3 } cwt. qr. lb. . . . .                           | 4/- 2/-                              |    |    |    |    |    |    |
|                       | 3 " " " " " 4.5 } @ 7d. per lb. . . . .   |                                      | 17 | 5  | 11 |    |    |    |
|                       | 40 per cent. discount, . . . . .  |                                      | 6  | 18 | 4  | 10 | 7  | 7  |
|                       | Cask, etc., 6/-; Freight to Liverpool, 6/6, . . . . .                               |                                      |    |    |    |    |    | 12 |
|                       |   |                                      |    |    |    |    |    | 6  |
|                       |   |                                      |    |    |    | 11 | 0  | 1  |
|                       | Amount of Case, 170, . . . . .  |                                      |    |    |    | 5  | 1  | 00 |
|                       | " " Case, 171, . . . . .  |                                      |    |    |    | 14 | 7  | 11 |
|                       | " " " 169, . . . . .  |                                      |    |    |    | 11 | 0  | 1  |
|                       |   |                                      |    |    |    | 30 | 9  | 0  |
|                       | Commission, 4 per cent., . . . . .  |                                      |    |    |    | 1  | 5  | 2  |
|                       | Dock and Town Dues, 1/3; Cartage, Portage, etc., 4/6; Shipping, 3/-, . . . . .      |                                      | 8  | 9  |    |    |    |    |
|                       | Bills of Lading, 1/6; Canal Ins., 1/2 per cent., 3/2; Consul's fee, 11/-, . . . . . |                                      | 15 | 8  |    | 1  | 4  | 5  |
|                       |   |                                      |    |    |    | 82 | 18 | 7  |
| E. E.                 |   |                                      |    |    |    |    |    |    |
|                       | pro ALFRED FIELD & CO.,<br>W. MINCHER.  |                                      |    |    |    |    |    |    |

## 200 CHARGES ON FOREIGN INVOICES.

Charges on arrival in Philadelphia:—

|  |                    |
|--|--------------------|
| <i>Duties on case 170, \$24.57, @ 40 %,</i>        | <i>10.00</i>       |
| <i>" " cases 171, 169, \$123.60, @ 35 %, 43.40</i> | <i>53.40</i>       |
| <i>Brokerage,</i>                                  | <i>2.00</i>        |
| <i>Fees, etc., 2.75, Triplicate Invoice, 1.25,</i> | <i>4.00</i>        |
| <i>Cartage,</i>                                    | <i>3.00</i>        |
| <i>Bonded Warehouse Fees,</i>                      | <i>7.00</i>        |
| <i>Freight from Liverpool,</i>                     | <i>18.35</i>       |
|  | <hr/> <i>87.75</i> |

In reckoning the cost of goods, the amount of all the charges is found, and then the invoice price of each article is increased in the proportion that the charges bear to the purchase price of the goods. The profits are to be added after finding the total cost.

In foreign invoices, when the prices are in pounds, shillings, or francs, it is frequently found convenient to increase the true value of the pound or franc in the proportion that the charges bear to the purchase price, and then obtain the total cost of each article by taking the currency at this increased valuation. For instance, if the charges were equal to 20% of the first cost of the goods, the shilling would be estimated at an advance of 20% on 22.2c.,—the par value of a shilling,—or at the valuation of 26.6c. Then, 300 yards extra ticking, @ 2 shillings per yard, would be marked as costing 53½c. per yard.

A franc, in an invoice on which the charges are equal to 66% of the invoice, would be reckoned at 66% advance on the exchange value of a franc. Or, the total cost of the invoice in United States currency may be divided by the number of shillings or francs in the total purchase price of the goods.

In the invoice on the next page, the cost is calculated in this manner, no account being taken of the particular discounts or charges, although for strict accuracy this should be done. The entire cost of each item is reckoned at 29c. per franc. Thus, 4 gross combs, @ 36 fr. per gross, cost  $36 \times 29 = \$10.44$  per gross.

Paris, October 16, 1882.

*Invoice of One Package Merchandise purchased by J. GLAENZER & VESSEPUY, JR., of Paris, for account and risk of MESSRS. E. CLINTON & Co., of Philadelphia, and shipped at Havre by SHERBETTE, KANE & Co. on board the Steamer Bosphorus, bound for New York, and consigned to themselves.*

|             |   |  |     |    |      |    |  |
|-------------|---|--|-----|----|------|----|--|
| E. C. & Co. | # | 1 CASE.                                    |     |    |      |    |  |
| #134        | # |  | 50  |    |      |    |  |
|             |   | 6. 13 kilo. Beau Blanc Bristles, @ fr. 11, | 149 | 50 |      |    |  |
|             |   | 7. 12 " " " " " " 12,                      | 150 | 00 |      |    |  |
|             |   |  | 299 | 50 |      |    |  |
|             | # | 3 per cent. discount, . . . .              | 8   | 95 | 290  | 55 |  |
|             | # | 3233. 4 gro. Buffalo Tuck Combs,           |     |    |      |    |  |
|             |   | @ fr. 36 net,                              | 144 |    |      |    |  |
|             |   | 3234. 3 " " " " 42 "                       | 126 |    |      |    |  |
|             |   | 3235. 2 " " " " 48 "                       | 96  |    |      |    |  |
|             |   | 3331. 36 doz. Hair Brushes, " 6 "          | 216 |    | 582  | 00 |  |
|             |   | 2899. 5 gro. Tooth Brushes,                |     |    |      |    |  |
|             |   | 4 R, @ fr. 51,                             | 255 |    |      |    |  |
|             |   | 2900. 5 " " " 5 R, @ fr. 63,               | 315 |    |      |    |  |
|             |   |  | 570 |    |      |    |  |
|             | # | 4 per cent. discount, . . . .              | 22  | 80 | 547  | 20 |  |
|             | # | 2911. 4 gro. Tooth Brushes, @ fr. 21,      | 84  |    |      |    |  |
|             |   | 2913. 3 " " " " 33,                        | 99  |    |      |    |  |
|             |   | " bis 3 " " " " 33,                        | 99  |    |      |    |  |
|             |   | 2919. 3 " " " " 45,                        | 135 |    |      |    |  |
|             |   | " bis 1 " " " " "                          | 45  |    |      |    |  |
|             |   |  | 462 |    |      |    |  |
|             |   | 2 per cent. discount, . . . .              | 9   | 20 | 452  | 80 |  |
|             |   |  |     |    | 1872 | 55 |  |
|             |   | Com. 3 per cent. on fr. 290.55 = 8.70      |     |    |      |    |  |
|             |   | " 5 " " 1582. = 79.10                      |     |    | 87   | 80 |  |
|             |   | 20. 15. 13.40. 5.25.                       |     |    |      |    |  |
|             |   | Packing, Boxes, Visa, Postage,             |     |    | 53   | 65 |  |
|             |   | Freight from Paris to Havre, . .           |     |    | 10   | 80 |  |
|             |   |  |     |    | 2024 | 80 |  |
|             |   | 15 days' interest, @ 6 per cent., . .      |     |    | 5    | 05 |  |
|             |   |  |     |    | 2029 | 85 |  |

*Charges and Duties paid in New York for account of invoice  
consigned to E. CLINTON & Co., Nov. 15/82.*

|  |    |    |       |    |
|--|----|----|-------|----|
| 25 kilos. = lbs. 55, @ fr. 15 per lb., . . .   | 8  | 25 |       |    |
| France, 290. <sup>55</sup> = \$54.00   |    |    |       |    |
| 366. = 70.00 @ 35%, . . .  | 24 | 50 |       |    |
| 1216. = 235.00 " 40%, . . .  | 94 | 00 | 126   | 75 |
| <u>1872.<sup>55</sup></u>  |    |    |       |    |
| Entry Bond, . . . . . @ \$0.50   |    |    |       |    |
| Oath, Transfer Order, etc., . . . 1.25   |    |    |       |    |
| Postage, . . . . . .15   |    |    |       |    |
| Cartage, . . . . . .75   |    |    |       |    |
| Bond for Triplicate Invoice, . . .75   |    |    |       |    |
| Contingent Exp. 50c, Com. 3.50, . 4.00   | 7  | 30 |       |    |
| Insurance, fr. 2024.80, @ 30c. pr. fr. =<br>\$607.44, @ 2½%, . . . . .   | 13 | 67 |       |    |
| Freight from Havre to New York, per<br>"Scotland," £1 9s. 11d. @ 4.80, . . .   | 7  | 18 |       |    |
| Freight and Drayage from New York to<br>Philadelphia, . . . . .  | 2  | 00 | 30    | 15 |
| Francs 2029.85, @ 5. <sup>20</sup> , . . . . .   |    |    | 390   | 36 |
| 1872. <sup>55</sup> fr. cost \$547.26.   |    |    | \$547 | 26 |
| Cost of 1 franc, 29½ + cents.  |    |    |       |    |
| <p><b>Note.</b>—25 kilogrammes B. B. Bristles pay a specific duty.</p> <p>For entire accuracy, omit duties and particular charges until the average, without them, is found. Then add the charges and duties per franc on any lot to the average already found for the value per franc on that particular lot.</p> <p>The average duty per franc may be found by dividing the amount of duties by the number of francs which the lot cost.</p> |    |    |       |    |



338. The length of credit has much to do with the accumulation of profits. The difference between long credits and short credits is shown in their effects in the following example :—

If a young man commences business with a capital of \$1000, and is able to turn it over every *three* months at 10% profit, in five years it will

|                                 |           |                                |           |
|---------------------------------|-----------|--------------------------------|-----------|
| <i>Amount to</i>                | \$6727.50 | <i>If every 3 mos. at 8 %,</i> | \$4660.96 |
| <i>If every 4 mos. at 10 %,</i> | 4177.25   | " 4 " "                        | 3172.17   |
| " 6 " "                         | 2593.74   | " 6 " "                        | 2158.93   |
| " 7 $\frac{1}{2}$ " "           | 2143.59   | " 7 $\frac{1}{2}$ " "          | 1850.93   |
| " 10 " "                        | 1771.56   | " 10 " "                       | 1586.87   |
| " 12 " "                        | 1610.51   | " 12 " "                       | 1469.33   |
| " 2 $\frac{1}{2}$ yrs. "        | 1210.00   | " 2 $\frac{1}{2}$ yrs. "       | 1166.40   |

339. One of the practical questions to be determined when reducing prices, is, Can enough more goods be sold at the reduced price to compensate for the reduced profits ?

#### QUICK SALES AND SMALL PROFITS.

A man commenced business on a borrowed capital of \$4000, and paid interest monthly at the rate of 6% per annum,—that is, \$20 per month. His expenses were \$180 per month additional. He invariably paid cash, thereby saving 5% discount on the invoice price. He sold his entire stock every month at an advance of 5% on the invoice price, and immediately reinvested the proceeds. What profit did he make by the end of the year?

*Ans.* \$4879.19.

#### ECONOMY THE SOURCE OF WEALTH.

At compound interest, in ten years, at 6 per cent.,

|   |        |
|---|--------|
| 2 $\frac{3}{4}$ cts. a day, or \$10 a year, will become | \$130. |
| 11 " 40 " "   | 520.   |
| 27 $\frac{1}{2}$ " 100 " "                              | 1300.  |
| 50 " 182.50 " "   | 2305.  |
| 100 " 365 " "   | 4814.  |

## MARKING GOODS.

340. It is customary in many mercantile houses to use a private mark, which is placed on the goods to denote their cost and selling price. A word or phrase containing ten different letters is taken, the letters of which are written instead of figures. For instance, the word "Cumberland" is selected; then the letters represent the figures as follows:

|   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
| C | u | m | b | e | r | l | a | n | d |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |

If it is required to mark 1.50, it is done thus, *ced*; 75 would be *le*; 37, *ml*, etc.

Blacksmith, Importance, Republican, Perth Amboy, Fair Spoken, Charleston, Now be sharp, Noisy Table, Black Horse, and Cash Profit, are among the words and phrases which can be used in this manner.

341. It sometimes happens that the selling price contains three figures, while the buying price contains but two. To prevent this difference from being noticed, the letter denoting the cipher is prefixed to the buying price. For instance, if the buying price was 87, it would be marked *dal*; and the selling price, 1.25, *cue*; thus giving each price three letters.

342. An extra letter, called a "Repeater," is used to prevent the repetition of a figure. Instead of writing *cdd* for 100, which would show at once that the two right hand figures were alike, and thus aid in giving a clue to the key-word, some additional letter would be selected for a repeater,—*y*, for instance,—and then the price would be written *cdy*; 225 would be written *uye*.

343. Instead of letters, arbitrary characters are frequently used, something like the following:

|   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
| ┘ | ∇ | ┐ | ◻ | △ | ◻ | × | ≠ | ⊥ | ◻ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |

Fractions may be designated by additional letters or characters. Thus, *f* may represent  $\frac{1}{2}$ , *w*  $\frac{2}{3}$ , etc.; or  $\frac{1}{4}$  may be written *o*,  $\frac{1}{4}$  +, etc.

344. The marks on packages, barrels, etc., are often some

arbitrary mark, or letter selected at random, or the initials of the purchaser placed there for the purpose of showing that the goods belonged to some particular lot, and are put on for the sake of distinction merely.

1. What is the profit, and what the selling price, of the following?

|                       |   | Gain.        | Selling Price. |
|-----------------------|---|--------------|----------------|
| <i>First cost, \$</i> | <i>1.10, Freight, 10 %,</i>                         | <i>20 %,</i> |                |
| "                     | <i>.50, " 20 %,</i>                                 | <i>10 %,</i> |                |
| "                     | <i>1.00,</i>  | <i>30 %,</i> |                |
| "                     | <i>4.80,</i>  | <i>15 %,</i> |                |
| "                     | <i>2.50, " 10 %,</i>                                | <i>20 %,</i> |                |
| "                     | <i>1.75,</i>  | <i>5 %,</i>  |                |
| "                     | <i>3.00, Charges, 7 <math>\frac{1}{2}</math> %,</i> | <i>25 %,</i> |                |

Mark the selling price of the above, using the word "Cumberland" instead of figures.

2. At what price must goods be sold, which were bought at \$2.50 per yard, in order to gain 20 per cent. profit? What would be the letters to mark the buying and selling prices, using the word Charleston instead of figures?

3. How much will a firm gain by buying goods offered at \$2.75 per doz., with a discount of 20 per cent. off, if they sell at 30 per cent. profit? and how would the selling price be marked, using Importance as the key-word?

4. What letters would be used in marking the selling price of single articles which were bought at \$3.50 per doz. and sold at 20 per cent. profit, using Cumberland as the key-word? (See Art. 325, page 188.)

5. What would be the selling price of imported articles bought at \$4.60, on which the charges were 50 per cent. of the purchase price, if they were sold at 40 per cent. profit on the total cost? How would the selling price be marked if the phrase Fair Spoken be used, with b as a repeater?

6. Use the word Cumberland, and write the following prices in letters: 65 cents, \$1.82, \$2.50, \$4.75, \$18.88, \$7.25, \$10.45, \$12.60.

## INVESTMENTS AND DIVIDENDS.

The value of an investment depends upon the *security* of the principal and income derived from it, its *productiveness*, its *permanency*, and the readiness with which it can be converted into money.

The principal forms of investment are United States Government bonds ; State, city, and county bonds ; the bonds and shares of corporations ; and bonds and mortgages on real estate, given by individuals.

The income from bonds is derived from a fixed rate of interest, and terminates when the bonds are paid. The income from shares of stock depends upon the prosperity of the company, and the amount of dividend or profits divided among the stockholders.

**Bonds** are obligations or deeds made under seal, securing the payment of a certain sum of money on or before a future day appointed.

When issued by governments or corporations, they are made in denominations of convenient size, bearing interest payable either quarterly, semi-annually, or annually.

**Registered Bonds** are those which are registered, and are made payable to the order of the holder, and can be transferred only upon a duly acknowledged assignment.

**Coupon Bonds** are bonds with interest certificates, or tickets, called *coupons*, attached, which are to be cut off and presented for payment as the interest for the different periods mentioned in the tickets becomes due. (See page 409.) As these bonds are made payable to the holder, or bearer, they can be transferred by mere delivery.

Registered bonds afford greater security in case they are lost, stolen, or destroyed ; but are not so convenient for sale and delivery as coupon bonds.

**Stock, or Capital Stock**, is the capital or property of a company or corporation.

The term **Stocks** is frequently applied to the various bonds of governments and corporations, as well as to shares.

**Shares** are the equal portions into which the capital stock is divided, and the owners are termed *stockholders*.

**Certificates of Stock** are the papers issued to the stockholders, specifying the number of shares to which they are respectively entitled, and signed by the proper officers.

**The Par Value** of stocks is the original or nominal value, as specified in the certificate.

**An Instalment** is a portion of the capital paid by the stockholders at a particular time.

**An Assessment** is a sum required of each stockholder, in proportion to his stock, for the purposes of the company.

**345. The Gross Earnings** consist of the entire receipts of a company.

**346. The Net Earnings** are what remains after the expenses are deducted.

**347. The Dividend** is the sum divided among the stockholders from the gains of the business.

**348.** Sometimes, in addition to the cash dividend, which is payable at a stated time, the company declare a *Scrip dividend*, for which certificates are issued payable on the contingency that the affairs of the company continue prosperous. This Scrip bears interest, or not, as the company may determine, and in some cases may be converted into stock.

**349. A Mortgage** is a conveyance of property as a pledge for the security of a debt, and becomes void when the debt is paid.

**350. Ground-Rents** is a term applied to leases of building lots, the rent of which is considered equivalent to the interest on the valuation of the land. The payment is generally secured by a claim on the building erected on the land occupied. By a recent law in Pennsylvania, no new ground-rent can be made irredeemable, but may be extinguished upon payment of a sum the interest of which is equal to the rent annually paid.

**351. Building Lots** are sometimes sold at so much per foot. The price is obtained by dividing the interest per annum on the valuation of the whole lot by the number of feet on the front; the quotient is the price per foot. Thus, a lot valued at \$3000, with a front of 20 feet, is said to be worth \$9 per foot; the interest on \$3000, which is \$180 per annum, being divided by 20, the number of feet on the front, gives \$9 as the price.

## NATIONAL DEBT OF THE UNITED STATES.

JULY 1, 1890.

## INTEREST-BEARING DEBT.

|  |                           |                           |
|--|---------------------------|---------------------------|
| <i>Bonds at 4½%,</i>   | <i>\$109,015,750</i>      |                           |
| <i>Bonds at 4%,</i>  | <i>602,193,500</i>        |                           |
| <i>Refunding Certificates at 4%,</i>   | <i>103,860</i>            |                           |
| <i>Navy Pension Fund at 3%,</i>  | <i>14,000,000</i>         |                           |
| <i>* Pacific R. R. Bonds at 6%,</i>  | <i><u>64,623,512</u></i>  |                           |
| <i>Principal,</i>  |                           | <i>\$789,936,622</i>      |
| <i>Interest due this date,</i>   |                           | <i><u>9,616,150</u></i>   |
|  |                           | <i>\$799,552,772</i>      |
| <i>Debt on which interest has ceased since maturity,</i>                                   |                           | <i>\$1,815,805</i>        |
| <i>Interest due on same,</i>   |                           | <i>149,131</i>            |
| <i>Old Demand and Legal-Tender Notes,</i>  |                           | <i>346,737,048</i>        |
| <i>Certificates of Deposit,</i>  |                           | <i>11,830,000</i>         |
| <i>Gold Certificates,</i>  |                           | <i>131,380,019</i>        |
| <i>Silver Certificates,</i>  |                           | <i>297,210,043</i>        |
| <i>Fractional Currency, \$15,287,444, less \$8,375,934 estimated as lost or destroyed,</i> |                           | <i><u>6,911,510</u></i>   |
|  |                           | <i>\$1,595,586,328</i>    |
| <i>Less cash items available for reduction of debt,</i>                                    | <i>\$452,001,409</i>      |                           |
| <i>Less reserve held for redemption of U. S. Notes,</i>                                    | <i><u>100,000,000</u></i> | <i><u>552,001,409</u></i> |
|  |                           | <i>\$1,043,584,919</i>    |
| <i>Cash in U. S. Treasury this date,</i>   |                           | <i><u>55,409,748</u></i>  |
| <i>Net amount of Debt July 1, 1890,</i>  |                           | <i>\$988,175,171</i>      |

\* These bonds are known as "Currency Sixes," and the Government holds second-mortgage liens on the Pacific Railroads as security for the same.

## UNITED STATES BONDS.

The different bonds issued for the funded loans mentioned in the statement of the National Debt are known by the rates of interest which they bear, and by the dates when they are redeemable or payable.

Currency Sixes are so called because the interest on them is made payable in "United States Treasury Notes, or any other money or currency which the United States have or shall declare lawful money and a legal tender." They are payable thirty years from their dates of issue, July 1, 1862, and July 2, 1864, with no option of the Government to call them in before maturity. They are all registered bonds of \$1000, \$5000, and \$10,000, and bear six per cent. interest payable January 1 and July 1.

Of the funded loans, viz., the *Four-and-a-half per cents.* and the *Four per cents.*, there are registered bonds in denominations of \$50, \$100, \$500, \$1000, \$20,000, and \$50,000, and coupon bonds of \$50, \$100, \$500, and \$1000. Principal and interest are payable in coin, and are exempt from taxation in any form by the United States, State, municipal, or local authority.

As the coupon bonds can be readily negotiated in European markets, they sell higher than registered bonds when there is a foreign demand for them. When the demand is for home investment exclusively, registered bonds have the preference; but rarely sell more than one-eighth of one per cent. higher than coupon bonds, because the coupon bonds can be converted into registered by forwarding them to the Treasury Department. Registered bonds cannot be thus converted into coupon bonds.

The quoted market prices of bonds include the accrued interest from last closing day of the transfer books; but the interest due before belongs to the owner of the bonds at the time of the closing of the books. As the interest matures on different bonds at different dates, this makes the bonds of one issue apparently higher than those of another, when the only difference is in the interest that has accrued. The prices of coupon bonds are quoted less after the interest has been collected than they were on the previous day.

## THE STOCK EXCHANGE.

The Stock Exchange is an association of brokers organized for the purpose of buying and selling stocks and other representatives of value.

It is governed by stringent regulations to prevent improper persons from becoming members, and to insure fidelity in the performance of engagements.

The admission fee varies, and where the number is limited to those who are already members, seats can be obtained only by purchase, besides an initiation fee. In the Philadelphia, New York, and San Francisco Stock Exchanges, seats have been sold from \$10,000 to \$24,000. None except members are permitted to transact business in the Exchange.

Daily sessions are held at which the securities dealt in are called in order from a list by the president or a clerk. Bids by those wishing to buy, or offers by those wishing to sell, are made as the name of the stock is called; and each sale is recorded by the secretary.

Persons who are not members generally buy or sell stocks through some broker, who is a member of the Exchange, by giving the order at his office, and the rates which he charges are regulated by the Exchange. No member can do business at any variation from the prescribed rates without subjecting himself to suspension from all privileges.

The usual charge for buying or selling United States bonds is  $\frac{1}{2}$  per cent. or  $12\frac{1}{2}$  cents for a bond of \$100; and the same on stocks of the par value of \$100 per share. The commission on other shares varies with the market price of the stocks from 50 cents to \$25 per hundred shares. On stocks not called at the Exchange, a much higher rate is usually charged.

In New York quotations of shares, except for Mining stocks, the percentage or price per \$100 of par value is given instead of the price of each share. The quotations for stocks whose par value is \$50 per share is the price for two shares. Thus, if Pennsylvania Railroad stock is quoted 118, it means the price for two shares, because the par value is \$50. Shares of the par value of \$25 are called quarter stocks, and the quoted price is



for four shares. In Philadelphia and in some other cities the price per share is quoted irrespective of its par value.

For broken or odd lots, as parts of 100 shares, of any kind, the quotations may vary from  $\frac{1}{4}$  to 2 per cent. from the prices for round lots.

A stock sold for cash is deliverable on the day sold. A stock sold "regular way" is deliverable and to be paid for on the next day. Where nothing else is specified, "regular way" is always understood. On sales for three days or less, no interest is charged; but for a longer period the buyer pays interest, unless "flat" is specified in the contract. The Exchange does not recognize any contract for more than sixty days.

A stock broker, in buying or selling for others, acts only as an agent for his principal, and cannot be held for the fraud or failure of others with whom he has made contracts. It is important, therefore, to deal with those of integrity and responsibility.

The Stock Exchange has a language peculiar to itself. A stock "broker" is one who receives and executes orders for persons who are not members of the Exchange. A stock "jobber" deals in stocks for his own account. A "stag," or outsider, conducts his transactions outside the Exchange.

A "bull" is one who operates for a rise in prices,—so called from the nature of a bull to toss with his horns. He is usually one who has purchased stock deliverable in the future, without the intention of holding it, but with a view to selling it again at an advance before "settling day" arrives. A "bear" is one who endeavors to depress prices,—so called from the nature of a bear to tear down with his claws. He generally has contracted to deliver more stock than he possesses, and consequently operates to cause a fall in prices, so that he may make a profit by buying at lower prices than those for which he sold. A "lame duck" is a member who is unable to fill his contracts, and is therefore expelled.

The term "short sales" is applied to sales of stock which the seller does not own at the time. "Seller's option" gives the person selling the privilege of delivery at any time intervening before the expiration of that mentioned in the contract, by his

giving one day's notice. "Buyer's option" gives the purchaser a claim for delivery on the same terms.

"Flat" in contracts and loans means without interest. Quotations are called "flat" when the accrued interest is included in the quoted price.

A "turn in stocks" is the purchase and sale of a single lot, and involves the variation in price, the interest for the time the stock is carried or owned, and the broker's charges. For instance, if a bond was purchased at par, for \$1000, the broker's charge,  $\frac{1}{2}$  per cent. for buying and the same for selling, would be \$2.50; and if the bond was held for sixty days the interest would be \$10, making a total cost of \$1012.50, above which the bond must be sold to gain a profit.

A "margin" is the deposit made with a broker for his protection against loss by the rise or fall in stocks purchased on credit for his customer. Interest is charged on the cost of the stock so purchased, and also brokerage for buying and selling.

"Collaterals" are stocks or values given as pledges or security for money borrowed. To "hypothecate" stocks is to pledge them as collaterals.

"Call loans" are generally made on collateral security, and are payable with the interest on demand or on giving one day's notice.

A "corner" in stocks is caused by a combination of operators formed to force some particular stock to higher prices for their own profit. They buy up all the shares of the stock to be affected that are in the market, including all offered by short sellers, and agree among themselves not to sell any until a specified price is reached. After they have thus rendered the stock scarce, and more shares have been sold "short" by others than can be obtained for delivery, the stock bought is suddenly called for, when the "short" sellers are obliged to pay whatever the holders of the stock may choose to ask. In many cases, instead of actually delivering the stock, the seller pays the buyer the difference in price. It sometimes happens, however, that by some unforeseen contingency, or violation of agreement by some of the pool, the corner is broken, and those engaged in it suffer heavy loss.

"Puts," "calls," and "spreads" or "straddles" belong to what is termed stock gambling, and are considered irregular by the Exchange.

## STOCK QUOTATIONS AND ABBREVIATIONS.

|                                 |      |                                |      |
|---------------------------------|------|--------------------------------|------|
| \$5,000 U. S. Currency 6's,     | 132  | \$1,000 Leh. Val. R.R.Cons.M., | 125  |
| 2,500 U. S. 4½'s, 1891,         | 115½ | 3,000 Reading R. R. n. Conv.,  | 67   |
| 18,000 U. S. 4's, 1907,         | 118½ | 7,000 N. Y. Central, lots,     | 149½ |
| 1,500 Penna. R. R. Allts.,      | 66½  | 250 1st Nat. Bank, 3 ds.,      | 130  |
| 500 H. & T. R. R. Mtg. 7's, 128 |      | 1,000 Morris Mining, b. 5,     | 16½  |
| 7,500 Texas Pac. 1st M.,        | 108½ | 1,500 N. Pac. R. R., s. 60,    | 97½  |
| 6,000 N. Pac. R. R. Prefd.,     | 87½  | 300 L.Shore R.R.,b.30 w.n.,    | 133½ |
| 5,000 N. Pac. R. R. Com.,       | 44½  | 150 Mich. Cent., ex. div.,     | 113½ |
| 200 Amer. Ins. Co. Sep.,        | 60   | 2,500 N. Y. C. 7's, int. off,  | 123½ |

**Explanations.**—"6's," "4½'s," "4's," and "7's" mean the rates of interest which the several bonds or mortgages bear. "Allts.," allotments,—the shares which give the holder the privilege of taking other shares at specified prices in proportion to the shares already held. "Mtg.," "Mt.," or "M.," Mortgage. "Prefd.," or "Pf.," Preferred, applied to stocks or bonds which give the holders a preference in dividends or interest, or some advantage over the other stock of the company. "Com.," Common Stock. "Sep.," Scrip (see page 03). "Cons.," Consolidated. "Conv.," Convertible, applicable to bonds that can be exchanged or converted into stock, lands, or other property. "Lots," or "ls.," means that the number of shares quoted is the aggregate of several sales. "3 ds." means sold on a credit of 3 days. "B. 5" means that the buyer has an option of calling for the stock at any time within 5 days. "S. 60" means deliverable at seller's option within the number of days mentioned. "B. 30 w.n." means that the buyer can call for the stock at any time within 30 days without notice. "Ex. div.," without the last dividend. "Ex. coup.," without coupon. "Ex. int.," or "int. off.," without the interest recently due.

## SELLER'S OPTION.

**300 Shares.**

Philadelphia, June 28, 1882.

*I have PURCHASED of Charles M. Enders Three Hundred Shares of the Stock of the Pennsylvania Railroad Company, at \$63 per share, payable and deliverable at his option, with interest at 6 per cent. per annum.*

JOSEPH T. CURRAN.

## BUYER'S OPTION.

**300 Shares.**

New York, July 16. 1882.

*I have SOLD to Morris T. Wingert Three Hundred Shares of the Stock of the Pennsylvania Railroad Company, at 126 per cent., payable and deliverable at his option, with interest at 6 per cent. per annum.*

ROBERT W. BELVILLE.

## INVESTMENTS AND DIVIDENDS.

352. To find what must be paid for stock purchased through a broker.

*Rule.*—Multiply the bonds or shares by the rate, and add brokerage. If purchased on a credit of more than 3 days, add interest for the whole time.

EXAMPLE 1.—What must I pay for 100 shares of Michigan Central Railroad stock, purchased at \$112.50 per share, 30 days, brokerage  $\frac{1}{8}\%$ ?

|   |                   |
|---|-------------------|
| 100 shares, at \$112.50, =                            | \$11,250.00       |
| Interest on \$11,250 for 30 days (6%),                | 56.25             |
| Brokerage on \$10,000, par value, @ $\frac{1}{8}\%$ , | 12.50             |
|   | <hr/> \$11,318.75 |

Ex. 2.—What shall I receive if I sell 300 shares Cleveland and Pittsburg Railroad stock, 60 days, at \$72, after paying a brokerage of 25 cents per share?

|  |                   |
|--|-------------------|
| 300 shares, at \$72, =                       | \$21,600.00       |
| Interest on \$21,600 for 60 days,            | 216.00            |
|  | <hr/> \$21,816.00 |
| Brokerage, 300 shares at 25 cents per share, | 75.00             |
|  | <hr/> \$21,741.00 |

353. To find the dividend on any given number of shares of stock.

*Rule.*—Multiply the par value of the stock by the rate of dividend, and divide the product by 100.

## EXAMPLES.

1. If I own 100 shares of Pennsylvania Railroad stock, the par value of which is \$50, how much shall I receive when a dividend of 5% is declared?

$$50 \times 5 = 2.50, \text{ dividend on 1 share.}$$

$$100 \times 2.50 = 250, \quad \text{“ “ 100 shares. Ans. } \$250.$$

2. How much will a stockholder of the New York Central Railroad Co. receive of a 4% dividend, who owns 500 shares, the par value being \$100 per share?

354. To find the rate of dividend.

*Rule.*—Multiply the dividend by 100, and divide by the par value of the stock.

#### EXAMPLES.

1. The receipts of a mining company in one year are \$170,000, clear of all expenses. The company has a capital of \$500,000, divided into shares of \$10 each. Reserving \$50,000 as a contingent fund, what rate of dividend can it declare for the year? what per month? and how much can be paid on each share of stock?

$$170000 - 50000 = 120000, \text{ amount to be divided.}$$

$$120000 \times 100 = 12000000 \qquad 12000000 \div 500000 = 24$$

*Ans.* 24% yearly, 2% monthly, 20c. per month on each share.

*PROOF.*—24% of 500000 = 120000, dividend to be declared.

2. A man subscribed for 300 shares of stock in a manufacturing company, the par value of which was placed at \$50 per share; but, after paying three instalments, amounting to 75% of the par value, a dividend of 3% was declared. How much will he receive, and at what rate per cent. on the actual cost?

$$3\% \text{ of } 50 = 1.50, \text{ dividend on one share.}$$

$$1.50 \times 300 = \$450, \text{ dividend on 300 shares.}$$

$$75\% \text{ of } 50 = \$37.50$$

$$1.50 \times 100 = 150.00 \qquad 150.00 \div 37.50 = 4$$

*Ans.* \$450. Total dividend = 4% on actual cost.

355. To find what rate of income will be derived from a given investment.

*Rule.*—Multiply the income by 100, and divide the product by the amount invested.

## EXAMPLES.

1. If I buy railroad stock at a premium of 6 per cent., and pay  $\frac{1}{4}$  per cent. brokerage, what per cent. of income shall I receive if its annual dividend is 7 per cent.?

$$7 \times 100 = 700 \quad 700 \div 106\frac{1}{4} = 6\frac{10}{17} \quad \text{Ans. } 6\frac{10}{17} \%.$$

2. What per cent. shall I receive if I buy stock, which pays 4% dividend, at a discount of 20%?

$$100 - 20 = 80, \text{ amount invested.}$$

$$4 \times 100 = 400 \quad 400 \div 80 = 5 \quad \text{Ans. } 5 \%.$$

3. If I pay 106 for United States 6% bonds, having 15 years to run, what per cent. shall I receive if I keep them until they mature, and then obtain the principal?

$$6 \% \text{ per year for 15 years} = \$90 \text{ interest.}$$

$$\begin{array}{r} \text{Principal,} \quad \quad \quad 100 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Total amount received,} \quad \quad 190 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Cost of bond,} \quad \quad \quad 106 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Total income,} \quad \quad \quad 84 \\ \hline \end{array}$$

To find what rate is required for \$106 to gain 84 in 15 years, see Art. 237.

$$106 \text{ at } 1\% = 1.06 \times 15 = 15.90, \text{ interest at } 1\% \text{ for 15 years.}$$

$$15.90)8400(5.283 + \quad \text{Ans. } 5\frac{283}{1000} \%.$$

4. What rate per cent. will be gained if I purchase United States 4% bonds, at a premium of 12%, if they are paid at the end of 16 years?

5. If N. Y. Central R. R. stock is purchased at a premium of 12%, what rate of income will a 6% dividend yield?

356. To find the price to be paid for stock to obtain a given rate upon the investment.

*Rule.*—Annex two ciphers to the rate per cent. which the stock produces, and divide by the required rate; the quotient will be the price to be paid.

## EXAMPLES.

1. At what price must railroad stock be purchased, which pays 6% on the par value of \$100, in order to obtain 7% income on the investment?

$$600 \div 7 = 85.71\frac{2}{7}. \quad \text{Ans. } \$85.71.$$

2. At what price must I purchase railroad stock of the par value of \$50 per share, which pays a dividend of 6%, that I may obtain an income of 8% on the investment?

$$\text{Ans. } \$37.50.$$

3. At what premium ought an 8% stock to sell, to equal 6% stock?

$$\text{Ans. } 33\frac{1}{3}.$$

4. At what rate must 6% stock be purchased to equal 8% stock? to equal 10% stock?

357. To find what rate must be obtained, that a given sum invested may bring a given income.

*Rule.*—Multiply the given income by 100, and divide the product by the sum invested.

## EXAMPLE.

1. If I invest \$5000, what rate per cent. must I receive to obtain an income of \$325 per year?

$$32500 \div 5000 = 6\frac{1}{2}\%.$$

2. What rate per cent. must be received on \$12,000 to yield an income of \$840 per year? On \$6000 to yield \$270? On \$20,000 to yield \$1500?

358. To find what sum must be invested that a given income may be obtained.

*Rule.*—Divide the required income by the rate of income per share, or per \$100, for the number of shares or bonds required, and multiply the quotient by the given price.

## EXAMPLES.

1. What sum must be invested in United States 6% bonds, at 108, to realize an income of \$1200 per annum?

$\$6 = \text{income per } \$100, — \$108 \text{ the price of } \$100 \text{ bonds.}$   
 $1200 \div 6 = 200, \text{ the number of bonds of } \$100 \text{ each.}$

$200 \times 108 = 21600. \qquad \text{Ans. } \$21600.$

2. What sum must be invested, at \$65 per share, in railroad stock which pays a dividend of 10% on the par value of \$50 per share, in order to obtain an income of \$520?

$10\% \text{ of } \$50 = \$5, \text{ income per share.}$

$\$520 \div \$5 = 104, \text{ the number of shares.}$

$104 \times \$65 = \$6760. \qquad \text{Ans. } \$6760.$

3. If United States 4 per cents. are selling at 110, how much must I invest in them to obtain a yearly income of \$2200?

359. To find the par value, when the premium or discount is given.

*Rule.*—Divide the given value of the stock by 1 increased by the rate per cent. of premium, or diminished by the rate per cent. of discount.

#### EXAMPLES.

1. Bought Mechanics' National Bank stock for 29, at which price I paid a premium of 16%. What is the par value?

*Ans.* \$25.

2. Sold Worcester and Nashua Railroad stock for \$91.66 $\frac{2}{3}$ , and received 10% above the par value. What is the par value?

*Ans.* \$83.33 $\frac{1}{3}$ .

3. Bought Philadelphia and Erie Railroad stock for \$47, which is 6% below par. What is the par value?

4. Bought Fulton Bank stock at 500% premium, for \$180. What is the par value of the shares?

*Ans.* \$30.

360. To find at what price a bond, having several years to run, must be purchased, that the interest and final payment will be equivalent to a given rate per annum on the investment.

*Rule.*—I. Find the amount of the given bond.

II. Find the present worth of this amount at the proposed rate.

*Note.*—No account is taken in this rule of interest on the annual payments of interest.



## EXAMPLES.

1. What shall I pay for a bond of \$100, having 5 years to run, with interest at 6%, in order to make it an 8% investment?

*Amount of \$100 for 5 years = \$130.*

*By Art. 239,  $130 \div 1.40 = 92.86$ . Ans. \$92.86.*

*Int. on \$92.86 at 8% for 5 yrs. = 37.14.  $92.86 + 37.14 = 130$ .*

2. At what price must I buy railroad 6% bonds, if they are paid in 4 years, in order to gain 7% on my investment?

3. Bought Kentucky State Bonds, bearing 5% interest, payable in 3 years, and received, when I obtained the principal, 6% on my investment. What did I pay?

4. How much must be paid for Currency Sixes which bear 6% interest, in order to receive 5% on my investment, if they are paid off in 12 years?

## STOCK INVESTMENT TABLE,

Showing the rate of Interest received on Stocks purchased, from 25 per cent. discount to 25 per cent. premium.

| Purchase Price. | RATE RECEIVED ON STOCK BEARING INTEREST AT |             |             |             |              |
|-----------------|--|-------------|-------------|-------------|--------------|
|                 | 5 per cent.                                | 6 per cent. | 7 per cent. | 8 per cent. | 10 per cent. |
| 75.             | 6.666                                      | 8.00        | 9.333       | 10.666      | 13.333       |
| 80.             | 6.25                                       | 7.50        | 8.75        | 10.000      | 12.500       |
| 85.             | 5.882                                      | 7.143       | 8.235       | 9.411       | 11.764       |
| 90.             | 5.555                                      | 6.666       | 7.777       | 8.888       | 11.111       |
| 95.             | 5.263                                      | 6.316       | 7.263       | 8.421       | 10.526       |
| 97.50           | 5.128                                      | 6.156       | 7.179       | 8.205       | 10.256       |
| 100.            | 5.000                                      | 6.000       | 7.000       | 8.000       | 10.000       |
| 105.            | 4.761                                      | 5.714       | 6.666       | 7.619       | 9.523        |
| 110.            | 4.545                                      | 5.454       | 6.363       | 7.272       | 9.090        |
| 115.            | 4.347                                      | 5.130       | 6.086       | 6.956       | 8.695        |
| 120.            | 4.166                                      | 5.000       | 5.833       | 6.666       | 8.333        |
| 125.            | 4.000                                      | 4.800       | 5.600       | 6.400       | 8.000        |

## FOREIGN QUOTATIONS OF U. S. BONDS.

**London Quotations.**—In 1874, the London Stock Exchange adopted a new standard of value in quoting United States securities, by which one dollar is estimated as equal to 4 shillings, or about 97½ cents, which needs about 2¼% of itself to bring it up to actual value. Consequently, in London, quotations, when a bond of \$100 is quoted at 102½, it is on the basis of 4 shillings to the dollar, and is only at actual par value.

**Paris Quotations.**—In Paris the price of exchange affects the quotations. On the Paris Bourse the bonds are estimated on the conventional basis of 5 francs to the dollar, while the actual value of a dollar in exchange transactions is 5.10 and 5.20, equal to a difference of \$2 to \$3 on \$100.

**Amsterdam Quotations.**—The value of United States stocks is computed on the basis of 2½ guilders or florins to a dollar, which is very nearly the average rate of exchange.

**Consols**, an abbreviation of "*Consolidated Annuities*," are Government bonds of Great Britain, bearing 3% interest, payable semi-annually, January 5th and July 5th. These bonds are redeemable only at the option of the Government.

**Rentes** are bonds issued by the French Government, bearing different rates of interest.

## TAXES.

**361. Taxes** are sums of money assessed on persons, property, incomes, or products, usually for some public purpose.

When assessed on persons without regard to property, they are called *Capitation or Poll Taxes*; and in some places the payment of a poll tax is required before the privilege of voting is granted.

**362. Property Tax** is assessed on real and personal estate, and is sometimes apportioned at a certain per cent., but usually as so many cents on \$100, or so many mills on \$1.

*Real Estate* includes immovable property, such as houses, lands, etc. All other property, such as money, notes, stocks, mortgages, furniture, tools, cattle, etc., is called *Personal Property*.

Taxes are also assessed by the United States Government on manufactures, sales, etc.

The persons who estimate the value of the property to be taxed, and apportion the taxes, are called the *Assessors*.

Before assessing taxes, it is necessary to ascertain the sum to be raised, including expenses for collection and the proportion which it is expected will be uncollectable.

**363.** To find what sum must be assessed to raise a given net amount.

*Rule.*—*Subtract the rate allowed for collection from \$1, and divide the net amount to be raised by the remainder: the quotient will be the entire sum to be assessed.*

#### EXAMPLES.

1. What sum must be assessed to raise \$950,000 net, allowing 5% for collection?

$$\$1.00 - .05 = .95. \quad \$950000 \div .95 = \$1000000.$$

*Ans.*

$$\text{PROOF.} - 5\% \text{ of } \$1000000 = \$50000. \quad \$1000000 - \$50000 = \$950000.$$

**364.** It is also necessary to find the number of persons liable to pay a poll tax, if any; to estimate the value of all property, both real and personal, to be taxed, and to make an inventory of it; to determine what portion of the tax is to be raised upon the polls, or articles of property upon which there is a specific tax (if any), and to divide it equally among them.

The amount to be raised by a specific tax must be deducted from the total amount of tax to be raised. Then,

**365.** To find how much must be paid on each dollar of taxable property to raise the remainder of the tax, we have the following

*Rule.*—*Divide the amount to be raised by the amount of taxable property, less that part on which nothing can be collected: the quotient will be the answer.*

#### EXAMPLES.

1. The tax assessed by a certain town is \$37,500; its property is valued at \$2,500,000. What rate per cent. is the tax?

and how much will be paid by a man whose property is assessed at \$12,000?

$$37500 \div 2500000 = .015, \text{ or, } 1\frac{1}{2} \text{ cts. tax per dollar.}$$

$$12000 \times 1\frac{1}{2}\% = \$180, \text{ Ans.}$$

**Proof.**—When a tax list is made out, the amount of the taxes of all the individuals in it should equal the whole tax assessed.

**Tax Table at Three Mills per Dollar.**

| \$          | \$         | \$          | \$            | \$ | \$ |
|-------------|------------|-------------|---------------|----|----|
| 1 pays .003 | 10 pay .03 | 100 pay .30 | 1000 pay 3.00 |    |    |
| 2 pay .006  | 20 " .06   | 200 " .60   | 2000 " 6.00   |    |    |
| 3 " .009    | 30 " .09   | 300 " .90   | 3000 " 9.00   |    |    |
| 4 " .012    | 40 " .12   | 400 " 1.20  | 4000 " 12.00  |    |    |
| 5 " .015    | 50 " .15   | 500 " 1.50  | 5000 " 15.00  |    |    |
| 6 " .018    | 60 " .18   | 600 " 1.80  | 6000 " 18.00  |    |    |
| 7 " .021    | 70 " .21   | 700 " 2.10  | 7000 " 21.00  |    |    |
| 8 " .024    | 80 " .24   | 800 " 2.40  | 8000 " 24.00  |    |    |
| 9 " .027    | 90 " .27   | 900 " 2.70  | 9000 " 27.00  |    |    |
| 10 " .030   | 100 " .30  | 1000 " 3.00 | 10000 " 30.00 |    |    |

2. A tax of \$5130 is to be raised by a certain town; the property to be taxed is assessed at \$430,000. There are 240 polls, each taxed \$1. What amount must be levied, allowing 5% commission for collecting? what will be the tax on \$1? and what will be the tax of each of the following persons?

A., who pays a tax on \$6000, and 1 poll.

B., " " " " " 5400, " 2 "

C., " " " " " 1550, " 4 "

**OPERATION.**

Tax to be levied on the town, \$5130. Rate of collection, 5%.

$100 - 5 = 95$ .  $5130 \div .95 = 5400$ , the amount to be assessed.

5 % of 5400 = 270, amount paid for collection.

240 polls at \$1 = \$240.

|  |         |
|--|---------|
| Total amount to be raised,                           | \$5400  |
| Less amount of poll tax,                             | 240     |
| Amount to be raised on property,                     | 5160    |
| $5160 \div 430000 = .012$ , or 12 mills on a dollar. |         |
| A's tax, \$6000 @ .012 =                             | \$72    |
| 1 poll,  | 1       |
| Total,   | \$73    |
| B's tax, \$5400 @ .012 =                             | \$60.80 |
| 2 polls,   | 2.00    |
| Total,   | \$62.80 |
| C's tax, \$1550 @ .012 =                             | \$18.60 |
| 4 polls,   | 4.00    |
| Total,   | \$22.60 |

3. How much tax will a person pay whose property is assessed at \$6400, if he pays 14% city tax, and  $\frac{1}{2}$  of 1% State tax, besides paying 5% United States tax on sales of \$1800?

4. What rate of tax is required to raise \$27,500 on property assessed at \$1,850,000?

## PROPORTION.

**366.** **Ratio** is the relative magnitude of two numbers of the same kind, and is found by dividing one by the other: thus, the ratio of 3 to 12 is 4.

A ratio is denoted by two dots similar to a colon: thus, 5 : 15 expresses the ratio of 5 to 15, and is read, As 5 is to 15.

It may also be written in the form of a fraction: thus,  $\frac{1}{4}$  expresses the relation of 4 to 16.

The two numbers compared are called the terms of the ratio, the first being the divisor, and the other the dividend.

The first term is called the *antecedent*, and the last the *consequent*.

The terms of a ratio must be of the same kind, or such as may be reduced to the same denomination. We cannot com-

pare 3 yds. with 6 dollars, but we can compare 3 yds. with 5 feet, because we can reduce yards to feet, and say, As 15 feet are to 5 feet.

Multiplying the consequent, or dividing the antecedent, multiplies the ratio.

Dividing the consequent, or multiplying the antecedent, divides the ratio.

Multiplying or dividing both antecedent and consequent does not alter the ratio. (See CANCELLATION, Art. 20.)

**367.** Proportion is an equality of ratios.

Thus,  $2 : 4 :: 10 : 20$  expresses that the ratio between 2 and 4 is the same as between 10 and 20, and is read, As 2 is to 4, so is 10 to 20.

The first and fourth terms are called the *extremes*; the second and third, the *means*.

*In every proportion the product of the means equals the product of the extremes.*

From this principle, having three terms of a proportion, we are enabled to find the fourth.

### SIMPLE PROPORTION, OR RULE OF THREE.

**368.** A Simple Proportion is expressed by an equality of two ratios, and consists of four terms. When three of the members of a proportion are given, two of them must be of the same kind, and the other must be of the same kind as the fourth term, or answer.

**369.** For finding the fourth term, we have the following

*Rule.*—Place the given number which is of the same kind as the required answer, as the third term.

Then, if from the nature of the question the number sought should be larger than the third term, place the greater of the two remaining terms for the second term, and the less for the first; but if the number sought should be less than the third term, place the less of the two remaining numbers for the second, and the greater for the first.

Reduce, if necessary, the first and second terms to the same

*denomination, and if the third term is a compound number, reduce it to the lowest term mentioned in it.*

*Then multiply the second and third terms together, and divide the product by the first term: the quotient will be the fourth term, or answer.*

EXAMPLES.

1. If 25 barrels of flour cost \$165, what will 35 barrels cost?

$$\begin{array}{r} 25:35::165 \\ \quad 35 \\ \hline 25 \overline{)5775} \\ \underline{231} \end{array}$$

*Ans.* \$231.

Since dollars are of the same kind as the answer sought, we place \$165 as the third term. Then, as 35 barrels will cost more than 25 barrels, we place 35, the larger number, for the second term, and 25, the smaller, for the first.

**By Analysis.**—If 25 barrels cost \$165, one barrel will cost \$6.60, and 35 barrels will cost 35 times \$6.60 = \$231.

2. If 7 yards of broadcloth cost \$24.50, how much will 12 yards cost at the same rate? *Ans.* \$42.

3. If 18 bushels of wheat cost \$27, what will 50 bushels cost?

4. What will 27 yards of cloth cost, if 48 yards cost \$36?

5. What will 100 shares of railroad stock cost, if 175 shares can be bought for \$12,500?

6. If 12 men build 16 rods of a wall in a day, how many rods will 9 men build?

7. How much will 14 yds. 3 qrs. cloth cost, at the rate of 10 yds. 1 qr. for \$20?

8. What will 22 gals. 2 qts. of wine cost, at the rate of \$15.50 for 6 gals. 1 qt. 1 pt.?

9. If  $\frac{5}{8}$  of an acre cost \$320.25, what will  $\frac{3}{4}$  of an acre cost, at the same rate?

COMPOUND PROPORTION.

**370. A Compound Proportion** is one which involves two or more simple ones.

Every example in Compound Proportion can be solved by two or more simple proportions.

All the terms of a compound proportion appear in couplets, except one, which is always of the same kind as the answer sought.

**Rule.**—1. Write the number which is of the same kind as the answer sought, for the third term.

2. Arrange the two terms of each ratio separately, as in simple proportion.

3. Multiply the continued product of the second terms by the third term, and divide the result by the continued product of the first terms.

**Note.**—The work may frequently be much abridged by cancellation.

#### EXAMPLES.

1. If 12 men in 30 days earn \$270, how many dollars will 18 men earn in 36 days?

$$12 : 18 :: 270$$

$$30 : 36$$

$$\hline 360 : 648 :: 270$$

$$648$$

$$360) 174960 (\$486 \text{ Ans.}$$

$$1440$$

$$\hline 3096$$

$$2880$$

$$\hline 2160$$

$$2160$$

\$270 is the same kind as the required term. 18 men will earn more than 12 men, and more can be earned in 36 days than in 30.  $12 \times 30 = 360$ .  $18 \times 36 = 648$ .

Or, by cancellation,

$$12 : 18 :: 270.$$

$$30 : 36$$

$$3$$

$$3 \times 9 \times 18 = 486, \text{ Ans}$$

**By Analysis.**—If 12 men earn \$270 in 30 days, 1 man will earn  $\frac{1}{12}$  of \$270 = \$22.50 in 30 days, and  $\frac{1}{30}$  of \$22.50 = 75c. in 1 day.

If 1 man earn 75c. in 1 day, 18 men will earn 18 times 75c., or \$13.50, in 1 day, and 36 times \$13.50 = \$486 in 36 days.

**By Simple Proportion.**—12 : 18 :: 270 : 405.

men. men. days. days.

$$30 : 36 :: 405 : 486.$$

Ans. \$486.



DISTRIBUTIVE PROPORTION.

**371. Distributive Proportion** is the method of dividing a number, or quantity, into parts which are proportional to given numbers.

**Note.**—This rule is also called Fellowship, or Partnership, the Rule of Proportional Division, and Partitive Proportion. For PARTNERSHIP, see page 234.

The principle of this rule can be easily applied to the solution of numerous questions of a practical nature, such as determining the profits and losses of partners in trade, apportioning the shares of participators in prize-money, finding the relative proportion of ingredients requisite to form a given quantity of a compound, apportioning taxes, school-rates, averaging, etc.

**Rule.**—*Multiply the whole quantity to be divided by each proportional number, and divide each product by the sum of the proportional numbers.* Or, use the following formula:

$$\left. \begin{array}{l} \text{Sum of the pro-} \\ \text{portional numbers} \end{array} \right\} : \left. \begin{array}{l} \text{Quantity or num-} \\ \text{ber to be divided} \end{array} \right\} :: \left\{ \begin{array}{l} \text{Each propor-} \\ \text{tional number.} \end{array} \right.$$

EXAMPLES.

1. Divide 300 into two parts which shall be to each other as 3 to 9.

$$3 + 9 = 12$$

$$12 : 300 :: 3 : 75 \text{ the less number.}$$

$$12 : 300 :: 9 : 225 \text{ the greater number.}$$

$$300 \text{ proof.}$$

2. Divide \$600 proportionately among 4 men whose shares are to each other as 3, 4, 5, 6.

$$3 + 4 + 5 + 6 = 18$$

$$18 : 600 :: 3 : 100 \text{ first man's share.}$$

$$18 : 600 :: 4 : 133\frac{1}{3} \text{ second " "}$$

$$18 : 600 :: 5 : 166\frac{2}{3} \text{ third " "}$$

$$18 : 600 :: 6 : 200 \text{ fourth " "}$$

3. Divide 450 shares of railroad stock among 3 persons in proportion to the number of shares already held by them. A owns 400, B 200, C 300. What number will each receive?

4. A, B, C, and D invest \$50,000 in a shipment to Cuba. A invests \$15,000, B invests \$20,000, C invests \$10,000, and D invests \$5000. They gain \$30,000. What is each partner's share of the profits?

5. A, B, and C do a piece of work for \$140. A does  $\frac{1}{5}$ , B  $\frac{1}{10}$ , C  $\frac{7}{10}$ . How much ought each to receive?  $\alpha$

6. Gunpowder is composed of 76 parts of nitrate of potass, 14 of carbon, and 10 of sulphur. How much of each ingredient will be required to make 12 cwt. gunpowder?

*Ans.* 9 cwt.  $13\frac{11}{16}$  lbs. nitrate of potass.

1 cwt. 2 qrs.  $20\frac{4}{5}$  lbs. carbon.

1 cwt.  $22\frac{19}{8}$  lbs. sulphur.

7. A, B, and C engaged in trade, and agreed to share the gains and losses in proportion to the amount each invested. A invested \$5000, B \$8000, C \$7000. They gained \$6600. What was each man's share?

#### COMPOUND DISTRIBUTIVE PROPORTION, OR DOUBLE FELLOWSHIP.

372. In Compound Distributive Proportion, each share is affected by different periods of time, or by different quantities or rates.

*Rule.*—Multiply each share by the time, or quantity, or rate, by which it is affected, and the products will be the proportional numbers. Then proceed as in Simple Distributive Proportion.

#### EXAMPLES.

1. A and B entered into partnership. A invested \$100 for 2 months, B invested \$200 for 3 months. They agreed to divide the gains and losses in proportion to the capital of each and the time for which it was invested. Their gains were \$280. How much was the share of each?

$$\$100 \times 2 \text{ mos.} = 200 \text{ for 1 month.}$$

$$\$200 \times 3 \text{ " } = 600 \text{ " 1 "}$$

$$800 : 280 :: 200 : 70, A's \text{ share.}$$

$$800 : 280 :: 600 : 210, B's \text{ share.}$$

2. If an iron enameller manufactures a mixture worth \$100, which he applies with equal thickness to the following lots, what does the mixture on each of the plates cost?

|  |                                  |
|--|----------------------------------|
| 14 plates, 8 in. wide, 10 in. long.      | $8 \times 10 = 80$ sq. in. each. |
| 10 " " 10 " " 20 " "                     | $10 \times 20 = 200$ " " "       |
| 20 " " 15 " " 20 " "                     | $15 \times 20 = 300$ " " "       |
| 14 plates each 80 sq. in. = 1120 sq. in. | $9120 : 100 :: 1120 : 12.27 +$   |
| 10 " " 200 " " = 2000 " "                | $9120 : 100 :: 2000 : 21.92 +$   |
| 20 " " 300 " " = 6000 " "                | $9120 : 100 :: 6000 : 65.78 +$   |
|  | 9120                             |

\$12.27, the cost of 14 plates. 1 plate costs 88 cts. nearly.  
1 sq. inch costs  $\frac{88}{100}$  or  $1\frac{1}{10}$  cts. nearly.

3. A, B, and C hired a pasture for \$45. A had 15 cows pastured 2 months, B had 8 cows pastured 3 months, and C had 9 cows pastured 4 months. How much should each pay?

4. If 4 oz. gold 22 carats fine be mixed with 8 oz. gold 18 carats fine, how much fine gold will there be in 6 oz. of the mixture?

**Note.**—The fineness of gold is usually expressed by saying that gold is so many carats fine; that is, that so many parts out of 24 are pure gold.

$$4 \text{ oz.} \times \frac{22}{24} = \frac{88}{24} \text{ oz. fine gold.}$$

$$8 \text{ oz.} \times \frac{18}{24} = \frac{144}{24} \text{ " " "}$$

$$\frac{88}{24} + \frac{144}{24} = \frac{232}{24} = \frac{29}{3}, \text{ the quantity of fine gold in 12 oz.}$$

$$8 + 4 = 12; \text{ then } 12 \text{ oz.} : \frac{29}{3} \text{ oz.} :: 6 : 4\frac{5}{6} \text{ oz.} \quad \text{Ans. } 4\frac{5}{6} \text{ oz.}$$

Or, **By Analysis.**—If there are  $\frac{29}{3}$  oz. pure gold in 12 oz. of the mixture, there is  $\frac{1}{12}$  of  $\frac{29}{3}$  or  $\frac{29}{36}$  oz. in 1 oz. of the mixture; and in 6 oz. there are 6 times  $\frac{29}{36} = \frac{29}{6}$  or  $4\frac{5}{6}$  oz.

### MEDIAL PROPORTION, OR ALLIGATION.

**373. Alligation** is the process of finding the value of a compound or mixture of articles of different values, or of forming a compound which shall have a given value, or one in which the articles shall be in a given proportion.

374. To find the average value of several articles when the quantity and rate are given.

*Rule.*—Multiply each quantity by its rate, and divide the sum of the products by the sum of the quantities. The quotient will be the average value.

#### EXAMPLES.

1. If 25 lbs. of tea worth 60¢ per lb. be mixed with 25 lbs. worth 36¢ and 40 lbs. worth 75¢, what is one pound of the mixture worth?

#### OPERATION.

$$\begin{array}{rcl} 25 \text{ lbs. @ } 60 \text{ ¢} & = & 15.00 \\ 25 \text{ " " } 36 & = & 9.00 \\ \underline{40 \text{ " " } 75} & = & 30.00 \\ 90 \text{ lbs. are worth} & \$ & 54.00 \end{array}$$

1 lb. is worth  $\$54.00 \div 90 = 60 \text{ ¢}$ . *Ans.*

2. If I mix 100 lbs. sugar worth 10¢ per lb., 36 lbs. worth 15¢ per lb., 80 lbs. worth 12¢. per lb., and 40 lbs. worth 9¢ per lb., what will one pound of the mixture be worth?

375. To find what quantities of ingredients of different values will form a compound of a given value.

*Rule.*—Find the gain or loss on one of each ingredient, then take as much of any ingredient as will make the gain and loss equal. Or,

At the left of the column containing the rates, write the mean rate. Then connect each rate that is less than the mean rate with one that is greater, and write the difference opposite the rate with which it is connected.

If more than one difference stand opposite to any number, add the differences together.

The differences, or sums of difference, written opposite any rate will denote the quantity of the ingredient to be taken at that rate.

**Note 1.**—If any article is of the mean rate, it need not be linked, as it is of the average value, and will not affect the rate.

**Note 2.**—Every pair of numbers joined, forms of itself a compound of the right proportions, whether taken separately, or in connection with others. This operation only gives the ratios of the several ingredients. If all the quantities found be multiplied or divided by the same number, they may be increased or diminished at pleasure, without affecting the proportion.

**Note 3.**—When part, or all, of the numbers contain fractions, they may be reduced to a common denominator, and their numerators used.

**Note 4.**—A variety of answers may be obtained by linking differently, all of which will be correct.

EXAMPLES.

1. In what proportion must a grocer mix coffee worth 15¢, 18¢, 20¢, 22¢, and 24¢ per pound, that the mixture may be worth 21¢ per pound?

FIRST OPERATION.

|                          |       |     |        |             |  |   |    |   |         |  |  |  |  |
|--------------------------|-------|-----|--------|-------------|--|---|----|---|---------|--|--|--|--|
| <i>By selling at 21¢</i> |       |     |        |             | <i>To make the gains and losses equal, instead of 1 lb. he can take 6 lbs. at 22¢, or 2 lbs. at 24¢.</i> |   |    |   |         |  |  |  |  |
| 1 lb.                    | worth | 15¢ | I gain | 6¢          | <i>Or 3 lbs. at 15¢ and gain 18¢</i>   |   |    |   |         |  |  |  |  |
| 1 "                      | "     | 18  | "      | 3           | 3 "  | " | 18 | " | 9       |  |  |  |  |
| 1 "                      | "     | 20  | "      | 1           | 9 "  | " | 24 | " | lose 27 |  |  |  |  |
|                          |       |     |        | <u>1</u>    |  |   |    |   |         |  |  |  |  |
|                          |       |     |        | Total gain, | 10   |   |    |   |         |  |  |  |  |
| 1 lb.                    | worth | 22¢ | I lose | 1¢          |  |   |    |   |         |  |  |  |  |
| 1 "                      | "     | 24  | "      | 3           |  |   |    |   |         |  |  |  |  |
|                          |       |     |        | <u>3</u>    |  |   |    |   |         |  |  |  |  |
|                          |       |     |        | Total loss, | 4  |   |    |   |         |  |  |  |  |

SECOND OPERATION.

|    |    |    |       |           |               |       |   |        |  |
|----|----|----|-------|-----------|---------------|-------|---|--------|--|
|    |    |    |       |           | <i>Proof.</i> |       |   |        |  |
| 21 | 15 | —3 | 3     | 3         | 3 lbs. @      | 15¢   | = | .45    |  |
|    | 18 | —3 | 3     | 3         | 3 "           | " 18  | = | .54    |  |
|    | 20 | —1 | 1     | 1         | 1 "           | " 20  | = | .20    |  |
|    | 22 | —1 | 1     | 1         | 1 "           | " 22  | = | .22    |  |
|    | 24 | —6 | 3 = 9 | 9         | 9 "           | " 24  | = | 2.16   |  |
|    |    |    |       | <u>17</u> | 17 "          | " 21¢ | = | \$3.57 |  |

2. If a grocer wishes to mix tea worth 70¢, 80¢, \$1, and \$1.10 per pound, that the mixture shall be worth 90¢ per pound, how many pounds of each must he use?

*Ans.* 1 lb. of each.

376. To find what quantity of each of the other ingredients must be used to make a compound of a given value, when the quantity of part, and the value of all, are given.

*Rule.*—Find the proportional numbers as in the last case, and divide the given quantity by its proportional number.

Multiply each remaining proportional quantity by the quotient so obtained, and the several products will be the required quantities.

## EXAMPLES.

1. How many pounds of sugar, worth 8¢, 12¢, and 24¢ per pound, must be mixed with 40 pounds worth 20¢, that the mixture may be worth 22¢ per pound?

$$\begin{array}{rcl}
 \text{OPERATION.} & & \\
 22 \left\{ \begin{array}{l} 8 \\ 12 \\ 20 \\ 24 \end{array} \right. & & \begin{array}{r} 2 \\ 2 \\ 2 \\ 2 \end{array} \\
 & & 14 + 10 + 2 = 26 \\
 & & \underline{32}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Then, } 2 \times 20 = 40 @ 8¢ & = & 3.20 \\
 2 \times 20 = 40 @ 12 & = & 4.80 \\
 2 \times 20 = 40 @ 20 & = & 8.00 \\
 26 \times 20 = 520 @ 24 & = & 124.80 \\
 \text{Ans. } 640 @ 22 & = & \$140.80
 \end{array}$$

40, the limited quantity, divided by 2, the proportional quantity of sugar at 20 cts., = 20, the ratio.

2. How much wine worth \$1.25, \$1.30, and \$1.40 per gallon must be mixed with 40 gallons worth \$1 per gallon, 10 gallons at \$1.20 per gallon, and 5 gallons at \$1.70 per gallon, that the mixture may be worth \$1.35 per gallon?

## OPERATION.

$$\begin{array}{rcl}
 40 \text{ gals. at } \$1 & = & 40.00 \\
 10 \text{ " " } 1.20 & = & 12.00 \\
 5 \text{ " " } 1.70 & = & 8.50 \\
 \hline
 55 & & 60.50
 \end{array}
 \qquad
 \begin{array}{l}
 \text{Average price per} \\
 \text{gallon, } \$1.10.
 \end{array}$$

$$1.35 \left\{ \begin{array}{l} 1.10 \\ 1.25 \\ 1.30 \\ 1.40 \end{array} \right. \quad 25 + 10 + 5 = \underline{40} \quad \begin{array}{r} 5 \\ 5 \\ 5 \\ 5 \\ \hline 55 \end{array}$$

55, the limited number of gallons, which average \$1.10, divided by 5, the proportional quantity, gives 11 for the ratio. Then,

$$\begin{array}{rcl} 5 \times 11 = 55 & \text{at } \$1.10 = & \$60.50 \\ 5 \times 11 = 55 & \text{" } 1.25 = & 68.75 \\ 5 \times 11 = 55 & \text{" } 1.30 = & 71.50 \\ 40 \times 11 = 440 & \text{" } 1.40 = & 616.00 \\ \hline & 605 & \$1.35 = 816.75 \end{array}$$

Ans. 605 gals.

**377.** To find the quantity required of each ingredient to make a compound of a given quantity, when the value of the ingredients is given.

*Rule.*—Find the proportional parts as before, and divide the quantity of the mixture by the sum of the proportional parts.

Multiply each quantity by the quotient thus obtained, and the several products will be the required quantities of each.

EXAMPLES.

1. A merchant received an order for 460 lbs. of sugar, at 15¢ per pound. He has in his store sugars worth 10¢, 12¢, 20¢, and 25¢ per pound. How much shall he take of each to fill the order?

OPERATION.

$$15 \left\{ \begin{array}{l} 10 \\ 12 \\ 20 \\ 25 \end{array} \right. \quad \begin{array}{r} 10 \\ 5 \\ 3 \\ 5 \\ \hline 23 \end{array} \quad \begin{array}{r} 10 \\ 5 \\ 3 \\ 5 \\ \hline 460 \end{array} \quad \begin{array}{rcl} 10 \times 20 = 200 & \text{at } 10\text{¢} = & \$20.00 \\ 5 \times 20 = 100 & \text{" } 12 = & 12.00 \\ 3 \times 20 = 60 & \text{" } 20 = & 12.00 \\ 5 \times 20 = 100 & \text{" } 25 = & 25.00 \\ \hline & 460 & 15 = \$69.00 \end{array}$$

20, average quantity.

Ans. 200 lbs. at 10¢, 100 lbs. at 12¢, 60 lbs. at 20¢, 100 lbs. at 25¢.

If a quantity is at the average rate, it may be disregarded until the other quantities are found, and then enough of that quantity taken to make the whole equal to the required compound.

As each combination is perfect in itself, if the result is in mixed numbers, when whole numbers are required, we may select some multiple of the pairs, and thus make up the quantity sought.

#### MISCELLANEOUS EXAMPLES.

1. What is the fineness of a composition consisting of 2 lb. 8 oz. gold 18 carats fine, 3 lb. 6 oz. 14 carats fine, 1 lb. 6 oz. 22 carats fine, and 1 lb. 6 oz. alloy?

2. A cask contains 30 gallons wine worth \$3 per gallon. What quantity will the cask contain after pouring in water until the contents are worth but \$2.50 per gallon?

3. A farmer wishes to mix rye at 70 cts. per bushel with corn at 90 cts. and oats at 50 cts. What quantity of each must he take to make the mixture worth 75 cts. per bushel?

4. A merchant wishes to fill a barrel which will hold 200 lbs. with sugar worth respectively 8 cts., 12 cts., and 14 cts. per lb., so that the mixture may be worth 13 cts. How much of each must he take?

5. A man bought 50 bbls. flour for \$500,—some at \$8 per bbl., some at \$9 per bbl., and some at \$12 per bbl. How many of each kind did he purchase? (*See Note 2, p. 231.*)



#### PARTNERSHIP SETTLEMENTS.

**378. Partnership** is the association of two or more persons for the transaction of business. Such an association is called a firm, house, or company, and the members of the association are called partners. (*See Partnership, page 373, and Articles of Agreement, page 376.*)

The means contributed by the members of the firm are called its **Capital**. Money, property, notes and debts due from others, are called **Assets**, or **Resources**. Debts which the firm owe are called **Liabilities**. Amounts withdrawn affect the original investment. They are sometimes counted as resources; but what has been withdrawn can hardly be con-



sidered a resource, and settlements based upon such estimates are frequently erroneous. When it is desired to retain the net capital at starting unchanged, the amounts withdrawn may be treated as resources; but they must be taken from each partner's capital to obtain his true share. Obligations assumed by the firm for a partner are to be treated in the same manner as sums withdrawn by him; and additional sums invested, or to which he is entitled, increase his original investment.

If the Resources are greater than the Liabilities, the difference is termed the **Net Capital**; if the Liabilities are greater than the Resources, the difference is termed the **Net Insolvency**. The difference between the total gains and the total losses is called **Net Gains**, or **Net Losses**.

When the net capital at closing exceeds the net capital at commencing, the difference is the net gain. When the net capital at closing is less than at commencing, the difference is the net loss. When there is an insolvency at closing, the sum of the net capital at starting, and the net insolvency, is the net loss.

When there is a net insolvency at commencing business, and a net capital at closing, the sum of both is the net gain; when the net insolvency at closing is greater than at commencing, the increase is the net loss.

**379.** The gains and losses of a firm are divided among the partners in accordance with the original agreement or contract between them. The division is seldom made in exact proportion to the amount invested: it is more customary to credit each partner with interest on his capital invested, less interest on sums withdrawn during the year.

Sometimes the skill of one partner is considered equivalent to another's capital; in some cases certain privileges are granted to him who invests most; and sometimes a stated salary is allowed each partner according to his ability, and is taken from the gains of the firm before they are divided.

#### EXAMPLES.

1. A merchant commenced business with \$5000 in cash, \$3000 worth of goods in store, and owing \$1500. At the end of the year he had \$2500 in cash, \$4200 in goods, \$3300 in

notes, and he owed to various persons \$1350. How much did he gain?

|                                     |                                |
|-------------------------------------|--------------------------------|
| \$5000 Cash.                        | \$2500 Cash.                   |
| 3000 Mdse.                          | 4200 Mdse.                     |
| 8000 Assets at commencing.          | 3300 Notes.                    |
| 1500 Liabilities.                   | 10000 Assets at closing.       |
| \$6500 Net cap. at commencing.      | 1350 Liabilities at closing.   |
|                                     | \$8650 Net capital at closing. |
| \$8650 — \$6500 = \$2150, Net gain. |                                |

2. A firm on January 1st, 1865, had a capital consisting of \$3200 in cash, \$18,500 in merchandise, and \$4600 in notes and debts due them; their debts amounted to \$2100. At the end of the year their assets were \$12,000 in merchandise, \$5000 in cash, and \$14,000 in notes and debts due them, 20% of which were considered worthless. Their liabilities were notes held by others against them, amounting to \$18,000. How much did they gain or lose?

380. To find each partner's share of the gains or losses, when the shares are in proportion to the investments.

*Rule.*—Place the amount invested by each partner as a numerator, and the whole capital of the firm as a denominator: the several fractions will express each partner's share. Then, Multiply the gain or loss by the fraction expressing each partner's share, and the product will be his share of the gain or loss. Or,

By DISTRIBUTIVE PROPORTION (See page 227):

The whole capital of the firm } : { Each partner's capital } :: { Whole gain or loss } : { Each partner's gain or loss.

Or, By PERCENTAGE:

Multiply each partner's capital by the percentage which the gains or losses may be of the capital of the firm.

#### EXAMPLES.

1. A, B, and C formed a partnership. A invested \$3000, B \$2500, and C \$1500. Their profits were \$2800, to be di-

vided in proportion to their capital. What was each partner's share?

## FIRST METHOD.

$$\begin{aligned}
 \$3000 + \$2500 + \$1500 &= \$7000, \text{ Firm's capital.} \\
 \frac{3000}{7000} &= \frac{3}{7}, \text{ A's share. } 2800 \times \frac{3}{7} = \$1200, \text{ A's gain.} \\
 \frac{2500}{7000} &= \frac{5}{14}, \text{ B's " } 2800 \times \frac{5}{14} = \$1000, \text{ B's "} \\
 \frac{1500}{7000} &= \frac{3}{14}, \text{ C's " } 2800 \times \frac{3}{14} = \$600, \text{ C's "} \\
 &\qquad\qquad\qquad \underline{\$2800, \text{ Firm's gain.}}
 \end{aligned}$$

## SECOND METHOD.

$$\begin{aligned}
 \$7000 : \$3000 :: 2800 : \$1200, \text{ A's gain.} \\
 \$7000 : \$2500 :: 2800 : \$1000, \text{ B's "} \\
 \$7000 : \$1500 :: 2800 : \$600, \text{ C's "} \\
 &\qquad\qquad\qquad \underline{\$2800, \text{ Proof.}}
 \end{aligned}$$

## THIRD METHOD.

$$\begin{aligned}
 &\$2800 \times 40\% \text{ of } \$7000. \\
 \$3000 \times 40\% &= \$1200, \text{ A's gain.} \\
 \$2500 \times 40\% &= \$1000, \text{ B's "} \\
 \$1300 \times 40\% &= \$600, \text{ C's "} \\
 &\qquad\qquad\qquad \underline{\$2800}
 \end{aligned}$$

2. A and B speculated in grain. A invested 1200 bushels of wheat, at \$1.50 per bushel; B invested 2000 bushels corn, at 80¢ per bushel. The gains and losses were shared in proportion to value of investment. Their net gains were \$510. What was the share of each?

## OPERATION.

$$\begin{aligned}
 1200 \text{ bus. at } \$1.50 &= \$1800. \quad \frac{1800}{3400} = \frac{9}{17} \text{ of } 510 = 270, \text{ A's gain.} \\
 2000 \text{ bus. at } .80 &= \$1600. \quad \frac{1600}{3400} = \frac{8}{17} \text{ of } 510 = 240, \text{ B's gain.}
 \end{aligned}$$

3. Four men purchased a piece of land for \$36,000. The first contributed \$20,000, the second \$10,000, the third \$4000, and the fourth \$2000. They sold the land at an advance of 50% on the purchase price. How much was each man's share of the gain?

4. A and B are partners. A invested \$15,000, and B \$6000. A's share of the gain or loss is  $\frac{2}{3}$ , B's  $\frac{1}{3}$ . At the end of the year their resources are \$35,000 in goods and cash, and their liabilities consist of notes outstanding to the amount of \$15,500. How much is the firm's net capital, and what is each partner's share of the gain or loss?

|                                   |          |                         |          |
|-----------------------------------|----------|-------------------------|----------|
| A's investment,                   | \$15,000 | Resources,              | \$35,000 |
| B's investment,                   | 6,000    | Liabilities,            | 15,500   |
| Firm's net capital at commencing, | \$21,000 | Firm's net cap.,        | \$19,500 |
| Deduct net capital at closing,    | \$19,500 | A's $\frac{2}{3}$ loss, | \$1,000  |
| Firm's net loss,                  | \$1,500  | B's $\frac{1}{3}$ " "   | 500      |
|                                   |          | Firm's net loss,        | \$1,500  |

### 381. To find each partner's interest at closing.

*Rule.—I. Find the firm's net capital or net insolvency at commencing and at closing.*

*II. Find the firm's net gains or net losses, and each partner's share. Then,*

*III. To each partner's original investment add any additional investments or sums to which he may be entitled, and his share of the net gains, if any; also, deduct the amounts withdrawn by him, and obligations assumed by the firm for him, and his share of the net losses, if any.*

*If the original agreement entitle him to any other sum, or make him responsible to the firm for any sum, add or subtract, as the case may be.*

### EXAMPLES.

1. A and B, having been in business 1 year, dissolve partnership. B retires, leaving A to continue the business and liquidate the debts of the firm. A invested \$12,000, B

\$10,000. Each is to receive interest on his investment, and share the gains and losses equally. How much did each gain? what is A's capital at closing, and how much should he pay B on retiring, the resources and liabilities being as follows?

| RESOURCES.                    |          | LIABILITIES.                  |          |
|-------------------------------|----------|-------------------------------|----------|
| Cash on hand,                 | \$5,000  | Personal debts firm owe per   |          |
| Personal debts due firm,      |          | Ledger,                       | \$8 170  |
| per Ledger,                   | \$12,000 | Bills payable,                | 4,200    |
| Less 25% for bad debts,       | 3,000    | Interest on notes and drafts, | 180      |
| Mdse., as per inventory,      | 16,530   | Total liabilities,            | \$12,500 |
| Bills receivable,             | 3,500    |                               |          |
| U. S. 4½ bonds,               | 4,000    |                               |          |
| Accrued interest on 4½ bonds, | 120      |                               |          |
| Real estate (store and lot),  | 6,500    |                               |          |
| Store fixtures,               | 350      |                               |          |
| Total resources,              | \$45,000 |                               |          |

OPERATION.

|   |          |                      |          |
|---|----------|----------------------|----------|
| Total resources,                                  | \$45,000 |                      |          |
| " liabilities,                                    | 12,500   |                      |          |
| Firm's net capital at closing,                    | \$32,500 |                      |          |
| Interest on A's investment, \$12,000 for 1 year = | \$720    |                      |          |
| " B's " 10,000 " =                                | 600      |                      |          |
| Firm's net capital at closing,                    | \$32,500 |                      |          |
| A's investment,                                   | \$12,000 |                      |          |
| Interest for 1 year,                              | 720      | 12,720               |          |
| B's investment,                                   | \$10,000 |                      |          |
| Interest for 1 year,                              | 600      | 10,600               | 23,320   |
| Firm's net gain in business,                      |          |                      | \$9,180  |
| A's investment,                                   | \$12,000 | B's investment,      | \$10,000 |
| Interest for 1 year,                              | 720      | Interest for 1 year, | 600      |
| His ½ net gains,                                  | 4,590    | His ½ net gains,     | 4,590    |
| A's net capital,                                  | \$17,310 | B's net capital,     | \$15,190 |
| A's net capital,                                  | \$17,310 |                      |          |
| B's " "   | 15,190   |                      |          |
| Firm's net capital, as before,                    | \$32,500 |                      |          |

2. D and E are partners ; each invested \$3000, and agreed to share the gains and losses equally. During the year, D drew out \$600, and E \$500. What were their gains at the end of the year, their resources and liabilities being as follows?

| RESOURCES.                     |             |
|--------------------------------|-------------|
| Cash on hand,                  | \$ 3500     |
| Mdse., as per inventory,       | 3600        |
| Bills receivable,              | 1200        |
| Debts due firm, as per Ledger, | <u>2500</u> |
| Total resources,               | \$10,800    |

| LIABILITIES.                   |            |
|--------------------------------|------------|
| Debts firm owe, as per Ledger, | \$ 1500    |
| Bills payable,                 | <u>800</u> |
| Total liabilities,             | 2,300      |
| Firm's net capital at closing, | \$3,500    |
| D invested,                    | \$3000     |
| Less amount withdrawn,         | <u>600</u> |
| D's credit balance,            | \$2400     |
| E invested,                    | 3000       |
| Less amount withdrawn,         | <u>500</u> |
| E's credit balance,            | \$2500     |
| Balance of investments,        | 4900       |
| Firm's net gain,               | \$3600     |

| PROOF.                        |             |                          |             |
|-------------------------------|-------------|--------------------------|-------------|
| D invested,                   | \$3000      | E invested,              | \$3000      |
| Withdrew,                     | <u>600</u>  | Withdrew,                | <u>500</u>  |
|                               | 2400        |                          | 2500        |
| $\frac{1}{2}$ net gains,      | <u>1800</u> | $\frac{1}{2}$ net gains, | <u>1800</u> |
| D's net cap. at closing,      | \$4200      | E's net cap. at closing, | \$4300      |
| D's net capital,              | \$4200      |                          |             |
| E's " "                       | 4300        |                          |             |
| Firm's net capital, as above, | \$8500      |                          |             |

3. A, B, and C form a partnership; A invests \$15,000, B \$12,000, and C nothing. They share the gains and losses as follows, viz.: A  $\frac{1}{2}$ , B  $\frac{1}{3}$ , and C  $\frac{1}{6}$ . A draws out during the year \$800, B \$900, and C \$400. What is each partner's capital, and what are the gains at the end of the year, when their resources amount to \$40,000, and their liabilities to \$44,000?

## OPERATION.

|                              |             |                           |            |
|------------------------------|-------------|---------------------------|------------|
| Liabilities,                 | \$44,000    | A's investment,           | \$15,000   |
| Less resources,              | 40,000      | Less am't withdrawn, 800  | \$14,200   |
| Firm's net insolvency,       | \$4,000     | B's investment,           | \$12,000   |
| A's $\frac{1}{2}$ loss,      | \$14,450.00 | Less am't withdrawn, 900  | 11,100     |
| B's $\frac{1}{3}$ "          | 9,633.33    |                           | \$25,300   |
| C's $\frac{1}{6}$ "          | 4,816.67    | Less am't withdrawn by C, | 400        |
| Total losses,                | \$28,900.00 | Firm's net investment,    | \$24,900   |
| A's investment,              | \$15,000    | Add firm's insolvency,    | 4,000      |
| Less amount withdrawn,       | 800         | Firm's net loss,          | \$28,900   |
|                              | \$14,200    | A's $\frac{1}{2}$ loss,   | \$14,450   |
| B's investment,              | \$12,000.00 | Net investment,           | 14,200     |
| Less am't withdrawn,         | 900.00      | A's net insolvency,       | \$250      |
|                              | \$11,100.00 | C's $\frac{1}{6}$ loss,   | \$4,816.67 |
| Less his $\frac{1}{6}$ loss, | 9,633.33    | Add am't withdrawn,       | 400.00     |
| B's net capital,             | \$1,466.67  | C's net insolvency,       | \$5,216.67 |
| A's insolvency,              |             |                           | \$250.00   |
| C's "                        |             |                           | 5,216.67   |
|                              |             |                           | 5,466.67   |
| Deduct B's net capital,      |             |                           | 1,466.67   |
| Firm's net insolvency,       |             |                           | \$4,000.00 |

4. In which a salary is allowed each partner. No interest account kept.

A, B, and C entered into partnership January 1st, 1865. A and B each invested \$7000, C invested \$14,000. A's share of the gains or losses was  $\frac{1}{2}$ , B's  $\frac{1}{3}$ , and C's  $\frac{1}{6}$ . A was to receive a salary of \$1000 per year, B \$1500, and C \$500 for services. A drew out \$650, B \$450, and C \$900. What was each partner's interest in the firm January 1st, 1866,

when their resources were \$54,500, and their liabilities \$13,500?

## OPERATION.

|                               |                             |                              |                 |
|-------------------------------|-----------------------------|------------------------------|-----------------|
| Resources,                    |                             |                              | \$54,500        |
| Liabilities,                  |                             |                              | <u>13,500</u>   |
| Firm's net capital,           |                             |                              | \$41,000        |
| A's investment,               | \$7000                      |                              |                 |
| Add salary,                   | <u>1000</u>                 |                              |                 |
|                               | 8000                        |                              |                 |
| Less am't withdrawn,          | <u>650</u>                  |                              |                 |
| A's credit balance,           |                             | 7350                         |                 |
| B's investment,               | \$7000                      |                              |                 |
| Add salary,                   | <u>1500</u>                 |                              |                 |
|                               | 8500                        |                              |                 |
| Less am't withdrawn,          | <u>450</u>                  |                              |                 |
| B's credit balance,           |                             | 8050                         |                 |
| C's investment,               | \$14,000                    |                              |                 |
| Add salary,                   | <u>500</u>                  |                              |                 |
|                               | 14,500                      |                              |                 |
| Less am't withdrawn,          | <u>900</u>                  |                              |                 |
| C's credit balance,           |                             | 13,600                       | 29,000          |
| Firm's net gains,             |                             |                              | <u>\$12,000</u> |
| A's credit balance, \$7,350   | B's credit balance, \$8,050 | C's credit balance, \$13,600 |                 |
| " ¼ gain, <u>3,000</u>        | " ¼ gain, <u>3,000</u>      | " ½ gain, <u>6,000</u>       |                 |
| Net capital, \$10,350         | Net capital, \$11,050       | Net capital, \$19,600        |                 |
| Proof.—A's net capital,       |                             | \$10,350                     |                 |
| B's. "                        |                             | 11,050                       |                 |
| C's "                         |                             | <u>19,600</u>                |                 |
| Firm's net capital, as above, |                             | \$41,000                     |                 |

5. In which amounts withdrawn are averaged, and interest is charged and allowed.

A and B entered into partnership January 1st, 1864. A invested \$12,000, and B \$14,500, the gains and losses to be shared equally; each partner to be allowed 6 per cent. on his



investment, and to be charged at the same rate on sums drawn out. A drew as follows: March 1st, \$300; July 9th, \$250; September 10th, \$200; December 16th, \$150. B drew, April 7th, \$100; August 4th, \$400; November 23d, \$250. What was each partner's interest January 1st, 1865, their resources and liabilities being as follows?

| RESOURCES.                  |          | LIABILITIES.             |          |
|-----------------------------|----------|--------------------------|----------|
| Cash,                       | \$3,600  | Personal debts firm owe, | \$11,500 |
| Personal debts due firm,    | 16,000   | Bills payable,           | 500      |
| Bills receivable,           | 1,400    | Total liabilities,       | \$12,000 |
| Mdse., as per inventory,    | 26,000   | Firm's net capital,      | 41,000   |
| Penna. Central R. R. stock, | 6,000    |                          | \$53,000 |
| Total resources,            | \$53,000 |                          |          |

Average date of amounts withdrawn by A, July 6th.

" " " " " B, Aug. 26th.

|                          |             |                          |             |
|--------------------------|-------------|--------------------------|-------------|
| A's investment,          | \$12,000.00 | B's investment,          | \$14,500.00 |
| Less am't withdrawn,     | 900.00      | Less am't withdrawn,     | 750.00      |
|                          | \$11,100.00 |                          | \$13,750.00 |
| Int. on investment,      |             | Int. on investment,      |             |
| \$12,000 for 1 year,     | 720.00      | \$14,500 for 1 year,     | 370.00      |
| Less int. on \$900 with- |             | Less int. on \$750 with- |             |
| drawn, from aver-        |             | drawn, from aver-        |             |
| age date, July 6th       |             | age date, Aug. 26th      |             |
| to Jan.1st(178 days),    | 26.70       | to Jan.1st(127 days),    | 15.87       |
|                          | 693.30      |                          | 854.13      |
| A's credit balance,      | \$11,793.30 | B's credit balance,      | \$14,604.13 |

Firm's net capital, \$41,000.00

A's credit balance, \$11,793.30

B's " 14,604.13 26,397.43

Firm's net gains, \$14,602.57

|                          |             |                          |             |
|--------------------------|-------------|--------------------------|-------------|
| A's investment, less     |             | B's investment, less     |             |
| am't withdrawn,          | \$11,100.00 | am't withdrawn,          | \$13,750.00 |
| Credit balance of int.,  | 693.30      | Credit balance of int.,  | 854.13      |
| His $\frac{1}{2}$ gains, | 7,301.29    | His $\frac{1}{2}$ gains, | 7,301.28    |
| A's net capital,         | \$19,094.59 | B's net capital,         | \$21,905.41 |

Firm's net capital, as above, \$41,000.00.

6. A, B, and C commenced business with a capital of \$6000 each. The gains and losses were to be shared equally, and each partner was to receive interest on his capital, and to pay interest on all sums withdrawn. At the close of the

year they had—Cash on hand, \$4250; Merchandise, \$16,500; Bills receivable, \$1000; Personal debts due them, \$4120.67. The firm owes—Bills payable, \$500; Personal debts, \$630.35.

During the year, A drew out \$1007.57, the interest on which to the end of the year was \$20.15; B drew \$2049.61, on which the interest was \$20.50; C drew \$3213.92, the interest on which was \$28.12. How much did they gain or lose, and what was each partner's capital at the end of the year?

**Note.**—When books are kept by Double Entry, the above results can be obtained with very little trouble.

7. When the capital of the firm or company is kept separate from the accounts of the partners, and the amounts withdrawn are to be considered as taken from the gains and not from the capital, the following forms of statement are generally adopted:

| ASSETS.                      |                  | LIABILITIES.                    |                  |
|------------------------------|------------------|---------------------------------|------------------|
| Real estate,                 | \$45,000         | Bills payable,                  | \$15,750         |
| Machinery and fixtures,      | 7,000            | Debts, per Ledger,              | 14,250           |
| Cash,                        | 2,500            | Capital stock,                  | 50,000           |
| Mdse., as per inventory,     | 8,500            | Net gains,                      | 22,900           |
| U. S. 4½% bonds,             | 6,000            | Jas. L. Hart's ½ gain, \$11,450 |                  |
| Accrued int. on do.,         | 120              | Less am't withdrawn, 3,400      |                  |
| Bills receivable,            | 12,000           | Balance,                        | \$3,050          |
| Central Pacific R. R. stock, | 5,000            | Robt. Hunter's ¼ gain, \$5,725  |                  |
| Partners' withdrawals and    |                  | Less am't withdrawn, 4,880      |                  |
| interest,—                   |                  | Balance,                        | \$845            |
| James L. Hart,               | 8,400            | P. S. Weston's ¼ gain, \$5,725  |                  |
| Robert Hunter,               | 4,880            | Less am't withdrawn, 3,500      |                  |
| Philip S. Weston,            | 3,500            | Balance,                        | \$2,225          |
|                              | <u>\$102,900</u> |                                 | <u>\$102,900</u> |

8. A and B commenced business as partners. A invested \$20,000, and B \$10,000, A sharing  $\frac{2}{3}$  and B  $\frac{1}{3}$  of the gains and losses. No interest account was kept. A drew out \$1700, and B \$2150. Their assets at the close of the year consisted of—Cash, \$4200; Bills receivable, \$8800; Mdse., \$26,000; and Personal debts, \$16,000. 10 per cent. of the personal debts are considered bad. Their liabilities are—Bills paya-

ble, \$3250; Personal accounts, \$11,250. If B should retire from the firm, how much ought he to receive?

| ASSETS.                    |                 | LIABILITIES.       |                 |
|----------------------------|-----------------|--------------------|-----------------|
| Cash,                      | \$4,200         | Bills payable,     | \$3,250         |
| Bills receivable,          | 8,800           | Personal accounts, | 11,250          |
| Mdse.,                     | 26,000          |                    | \$14,500        |
| Personal accts., less 10%, | 14,400          | Capital invested,  | 30,000          |
|                            | \$53,400        |                    | \$44,500        |
| Add amount drawn out,      | 3,850           | Firm's net gain,   | 12,750          |
|                            | <u>\$57,250</u> |                    | <u>\$57,250</u> |

| DR.          |            | CR.                     |                 |
|--------------|------------|-------------------------|-----------------|
| A's account. | Drawn out, | Capital,                | \$20,000        |
|              | Balance,   | $\frac{1}{2}$ net gain, | 8,500           |
|              |            |                         | \$28,500        |
|              |            |                         | <u>\$28,500</u> |
| B's account. | Drawn out, | Capital,                | \$10,000        |
|              | Balance,   | $\frac{1}{2}$ net gain, | 4,250           |
|              |            |                         | \$14,250        |
|              |            |                         | <u>\$14,250</u> |

## DETECTING ERRORS IN TRIAL BALANCES.

**382. The Trial Balance** is the best short test of the correctness of account-books that has yet been devised. It is not, however, entirely reliable; because its equilibrium is not affected by posting into the wrong account, or omitting to post both a debit and a credit of equal amounts.

When the Trial Balance is not in equilibrium, to discover where the error exists,—

1. Ascertain the exact amount of the error. Omitting to do this has led to prolonged search for what did not really exist.

2. If the error is of large amount, examine whether the amounts have been entered in the Trial Balance correctly. Many mistakes are made in transferring amounts from one place to another. For this reason, some book-keepers always post with their Ledger on their right, to prevent reading the figures backwards.

3. Examine the Cash Balance: it can never be on the credit side, and should agree with the amount actually on hand.

The balance of Bills receivable should never be on the credit side, nor the balance of Bills payable on the debit side of the account.

4. If posts are made directly from the Cash Book, see whether the balance brought down from the previous month has been deducted from the debit footing before posting to the debit of cash. The total debit footing, less the balance from the previous month, is the proper amount to post.

5. Examine the books, to find an amount corresponding with the error, or with half the error; an amount posted to the wrong side of an account will produce an error in balancing equal to twice the amount.

6. Divide the error by 9. It is a principle in figures that the difference between any number and the same number transposed in whole, or in part, may be divided by 9 without a remainder, and the sum of the figures in the difference will make 9's. Thus, the difference between 753 and 735 =  $18 \div 9 = 2$ , and  $1 + 8 = 9$ .

|                    |                    |                    |                    |
|--------------------|--------------------|--------------------|--------------------|
| <i>9753</i>        | <i>9753</i>        | <i>9753</i>        | <i>9753</i>        |
| <u><i>7953</i></u> | <u><i>9573</i></u> | <u><i>9735</i></u> | <u><i>3579</i></u> |
| <i>1800</i>        | <i>180</i>         | <i>18</i>          | <i>6174</i>        |

Errors in transposition are among the most difficult of detection.

7. See whether the footings of the accounts and the balances are correct.

If the error is in one figure only, it is generally an error in adding, carrying, or transferring.

If the error is in the dollar column or cent columns only, the columns on the left need not be re-added.

8. If, after the above examinations, the error remains undiscovered, examine each post separately, and check the amounts both in the book from which postings are made and in the Ledger, and then examine the amounts to see if any remain unchecked. If the entries are made correctly, and the amounts are in equilibrium before posting, by following the above suggestions the error will soon be detected.

## FRAUDULENT BALANCES.

**383.** To ascertain the true weight with fraudulent balances, when the weights are accurate.

*Rule.*—Find what weights balance the substance to be weighed; then transpose them, and find the weight that will produce an equilibrium; then multiply together the two weights thus found, and extract the square root of the product.

*EXAMPLE.*—If by the first weighing the article weighs 8 lbs., and by the second it weighs  $10\frac{1}{2}$  lbs., the product is 81, the square root of which is 9, the true weight.

## MARINE OR GENERAL AVERAGE.

**384. General Average** means a contribution made by all parties concerned towards a loss sustained by some of the parties in interest, for the benefit of all. In such cases, the loss arising from the contribution falls within the provisions of the insurance policy.

No general average takes place unless it can be shown that the *danger was imminent*, that the sacrifice was *voluntary* and *considered indispensable* for the safety of the rest, and that the portion which was saved *was saved by reason of the sacrifice*.

**385. Particular Average** is any partial loss, without being voluntarily encountered, and is borne wholly by the owner of the property damaged. In cases of particular average, the indemnity is to be adjusted upon a comparison of the gross proceeds of the sound and the damaged goods.

**386. Jettison** (from the French *jeter*, to throw) is the portion of goods thrown overboard.

**387. Salvage** is an allowance or remuneration made to those by whose exertions ships or goods are saved from the dangers of the seas, fire, or enemies.

**388.** The cargo, including the part sacrificed, is valued at the price it would have sold for in *cash* at the port of destination.

The ship, and freight, and every thing on board which pays freight, contribute to general average. The wages of seamen

do not contribute, that they may have no interest in opposing a sacrifice necessary to the general safety.

From the freight  $\frac{1}{2}$  is usually taken (in New York  $\frac{1}{2}$ ) for seamen's wages, pilotage, etc., to find its contributory value.

In the valuation of repairs, masts, cables, etc., it is customary to deduct  $\frac{1}{3}$ ,—thus estimating the old as worth  $\frac{2}{3}$  the value of the new.

*Statement of General Average of the "Fairweather," PERRAN J. COOKE, Master, from New York to New Orleans, in consequence of losing part of her rigging by a violent gale, in getting aground on Stirrup Key, and by throwing part of her cargo overboard, as appears by protest, etc.*

| AMOUNT OF LOSSES.   |          |       |         |            |    |
|---|----------|-------|---------|------------|----|
| Paid Geo. Burton and Wm. H. Taylor, of the Sloops Emily and Shamrock, for assistance in getting vessel off, as per agreement, |          |       |         | \$8000.00  |    |
| Protests, postages, stamps, etc.,   |          |       |         | 5.00       |    |
| Value of goods thrown overboard :   |          |       |         |            |    |
| Fosdick & Co.'s goods,  | \$1800   |       |         |            |    |
| G. Porchs' "  | 3840     |       |         |            |    |
| Gustav Piaggio's "  | 4000     |       | 9640.00 |            |    |
| Freight of goods thrown overboard,  |          |       |         | 6000.00    |    |
| Adjustment of average, and certificate,   |          |       |         | 25.00      |    |
| Total losses,   |          |       |         | \$23670.00 |    |
|   |          |       |         | 23670      | 00 |
| CONTRIBUTORY INTERESTS.   |          |       |         |            |    |
| Ship Fairweather, valued at   | \$45000. | Pays, |         | 10651      | 50 |
| Goods of Fosdick & Co.,   | \$12500. | "     | 2958.75 |            |    |
| " " G. Porchs,  | 17250.   | "     | 4083.07 |            |    |
| " " Gustav Piaggio,   | 4000.    | "     | 946.80  |            |    |
| " " J. Burnside & Co.,  | 5250.    | "     | 1242.68 |            |    |
| Total cargo valued at, as per invoices,   |          |       |         | 39000.     | "  |
| Freight, \$24000, less $\frac{1}{6}$ , =  |          |       |         | 16000.     | "  |
|   |          |       |         | \$100000.  | "  |
| Rate of contribution, 23.67 per cent.   |          |       |         | 23670      | 00 |
| PARTICULAR AVERAGE ON THE SHIP.   |          |       |         |            |    |
| Repairs, new masts, yards, etc., as per bills,  |          |       |         | 4275.00    |    |
| Less $\frac{1}{3}$ for new,   |          |       |         | 1425.00    |    |
| Ship's value, \$45000, at $6\frac{1}{2}$ per cent. =  |          |       |         | \$2850.00  |    |

The different parties, if fully insured, can recover from the insurance companies the amount contributed to the general loss.

**389.** The rules for adjusting averages—with all the incidents of general average, salvage, and the like—are different in different countries. In most commercial ports the calculations are made by Adjusters of Averages,—a class of men who have a knowledge of the customs of the place and an extended experience, both of which are necessary in order to have a full understanding of the subject. The proportions of general average are calculated as follows :

**390. To apportion general average.**

*Rule I.*—Divide the sum of the losses by the sum of the contributory interests, and multiply each contributory interest by the quotient thus found ; the product will be the contribution of each interest to the general loss.

Or, *Rule II.*—By PROPORTION. (See page 224.)

Sum of the } : { sum of the } :: { each contributory } : { sum to be  
contributory interest } losses } interest } contributed.

MISCELLANEOUS EXAMPLES.

1. What sum must be insured, at a premium of  $1\frac{1}{2}\%$ , to cover the total loss, insurance included, of a cargo valued at \$2731.25, charges \$10.25, policy \$1?

2. What will it cost to insure goods worth \$3500, at a premium of  $\frac{3}{4}\%$ , if the policy includes  $10\%$  advance on the value of the goods?

3. I paid \$32 for an insurance on goods worth \$4800, shipped from Boston to Philadelphia. What rate did I pay? (See Art. 176.)

4. A merchant shipped a cargo valued at \$15,000 from New York to Cuba, which he insured at  $2\frac{1}{2}\%$ . The additional charges were \$425. For how much must he sell the cargo to gain  $20\%$  on the entire cost?

## COMPOUND INTEREST.

**391.** Compound Interest is interest on both principal and interest.

**392.** To compute compound interest.

*Rule.*—Find the interest on the given principal to the time the interest becomes due, and add the principal. Then find the interest on this amount for the next period, and add as before, and so continue for each successive period to the time of settlement.

Subtract the given principal from the last amount, and the remainder will be the compound interest.

When the time is for years, months, and days, find the amount for the years, and the interest on this for the remainder of the time.

When interest is payable oftener than once a year, find the amount for each interval in the same manner as when the interest is payable yearly.

## EXAMPLES.

1. What is the compound interest of \$500 for three years, at 5%?

|               |                                |
|---------------|--------------------------------|
| \$ 500        | Given principal.               |
| <u>.05</u>    |                                |
| 25.00         | Interest for first year.       |
| <u>500</u>    |                                |
| 525.00        | Principal for second year.     |
| <u>.05</u>    |                                |
| 26.25         | Interest for second year.      |
| <u>525</u>    |                                |
| 551.25        | Principal for third year.      |
| <u>.05</u>    |                                |
| 27.5625       | Interest for third year.       |
| <u>551.25</u> |                                |
| 578.8125      | Amount for three years.        |
| <u>500</u>    | Given principal.               |
| \$ 78.8125    | Compound interest for 3 years. |

2. What is the compound interest of \$425 for 4 years, at 6%? of \$275.50 for 3 years 6 months, at 7%?

**393.** The labor of computing compound interest may be much abridged by the use of the following tables:



TABLE I.

Showing the Amount of One Dollar at Compound Interest, from  $\frac{1}{2}$  to  $4\frac{1}{2}$  per cent., for any number of years not exceeding twenty.

|    | $\frac{1}{2}$ per cent. | $1\frac{1}{2}$ per cent. | 2 per cent. | $2\frac{1}{2}$ per cent. |    |
|----|-------------------------|--------------------------|-------------|--------------------------|----|
| 1  | 1.005000                | 1.015000                 | 1.020000    | 1.025000                 | 1  |
| 2  | 1.010025                | 1.030220                 | 1.040400    | 1.050625                 | 2  |
| 3  | 1.015075                | 1.045670                 | 1.061208    | 1.076891                 | 3  |
| 4  | 1.020150                | 1.061350                 | 1.082432    | 1.103813                 | 4  |
| 5  | 1.025251                | 1.077270                 | 1.104081    | 1.131408                 | 5  |
| 6  | 1.030377                | 1.093429                 | 1.126162    | 1.159693                 | 6  |
| 7  | 1.035529                | 1.109830                 | 1.148686    | 1.188686                 | 7  |
| 8  | 1.041207                | 1.126479                 | 1.171659    | 1.218403                 | 8  |
| 9  | 1.046413                | 1.143375                 | 1.195093    | 1.248863                 | 9  |
| 10 | 1.051645                | 1.160526                 | 1.218994    | 1.280085                 | 10 |
| 11 | 1.056904                | 1.177934                 | 1.243374    | 1.312087                 | 11 |
| 12 | 1.062188                | 1.195603                 | 1.268242    | 1.344889                 | 12 |
| 13 | 1.067499                | 1.213537                 | 1.293607    | 1.378511                 | 13 |
| 14 | 1.072836                | 1.231740                 | 1.319479    | 1.412974                 | 14 |
| 15 | 1.078199                | 1.250216                 | 1.345868    | 1.448298                 | 15 |
| 16 | 1.083589                | 1.268969                 | 1.372786    | 1.484506                 | 16 |
| 17 | 1.089007                | 1.288003                 | 1.400241    | 1.521618                 | 17 |
| 18 | 1.094452                | 1.307323                 | 1.428246    | 1.559659                 | 18 |
| 19 | 1.099924                | 1.326932                 | 1.456811    | 1.598650                 | 19 |
| 20 | 1.105424                | 1.346835                 | 1.485947    | 1.638616                 | 20 |

|    | 3 per cent. | $3\frac{1}{2}$ per cent. | 4 per cent. | $4\frac{1}{2}$ per cent. |    |
|----|-------------|--------------------------|-------------|--------------------------|----|
| 1  | 1.030000    | 1.035000                 | 1.040000    | 1.045000                 | 1  |
| 2  | 1.060900    | 1.071225                 | 1.081600    | 1.092025                 | 2  |
| 3  | 1.092727    | 1.108718                 | 1.124864    | 1.141166                 | 3  |
| 4  | 1.125509    | 1.147523                 | 1.169859    | 1.192519                 | 4  |
| 5  | 1.159274    | 1.187686                 | 1.216653    | 1.246182                 | 5  |
| 6  | 1.194052    | 1.229255                 | 1.265319    | 1.302260                 | 6  |
| 7  | 1.229874    | 1.272279                 | 1.315932    | 1.360862                 | 7  |
| 8  | 1.266770    | 1.316809                 | 1.368569    | 1.422101                 | 8  |
| 9  | 1.304773    | 1.362897                 | 1.423312    | 1.486095                 | 9  |
| 10 | 1.343916    | 1.410599                 | 1.480244    | 1.552969                 | 10 |
| 11 | 1.384234    | 1.459970                 | 1.539454    | 1.622853                 | 11 |
| 12 | 1.425761    | 1.511069                 | 1.601032    | 1.695881                 | 12 |
| 13 | 1.468534    | 1.563956                 | 1.665074    | 1.772196                 | 13 |
| 14 | 1.512590    | 1.618695                 | 1.731676    | 1.851945                 | 14 |
| 15 | 1.557967    | 1.675349                 | 1.800944    | 1.935282                 | 15 |
| 16 | 1.604706    | 1.733986                 | 1.872981    | 2.022370                 | 16 |
| 17 | 1.652848    | 1.794676                 | 1.947900    | 2.113377                 | 17 |
| 18 | 1.702433    | 1.857489                 | 2.025817    | 2.208479                 | 18 |
| 19 | 1.753506    | 1.922501                 | 2.106849    | 2.307860                 | 19 |
| 20 | 1.806111    | 1.989789                 | 2.191123    | 2.411714                 | 20 |

TABLE II.

Showing the Amount of One Dollar at Compound Interest, from 5 to 12 per cent., for any number of years not exceeding twenty.

|    | 5 per cent. | 6 per cent.  | 7 per cent.  | 8 per cent.  |    |
|----|-------------|--------------|--------------|--------------|----|
| 1  | 1.050000    | 1.060000     | 1.070000     | 1.080000     | 1  |
| 2  | 1.102500    | 1.123600     | 1.144900     | 1.166400     | 2  |
| 3  | 1.157625    | 1.191016     | 1.225043     | 1.269712     | 3  |
| 4  | 1.215506    | 1.262477     | 1.310796     | 1.360489     | 4  |
| 5  | 1.276282    | 1.338226     | 1.402552     | 1.469328     | 5  |
| 6  | 1.340096    | 1.418519     | 1.500730     | 1.586874     | 6  |
| 7  | 1.407100    | 1.503630     | 1.605781     | 1.713824     | 7  |
| 8  | 1.477455    | 1.593848     | 1.718186     | 1.850930     | 8  |
| 9  | 1.551328    | 1.689479     | 1.838459     | 1.999005     | 9  |
| 10 | 1.628895    | 1.790848     | 1.967151     | 2.158925     | 10 |
| 11 | 1.710339    | 1.898299     | 2.104852     | 2.331639     | 11 |
| 12 | 1.795856    | 2.012196     | 2.252192     | 2.518170     | 12 |
| 13 | 1.885649    | 2.132928     | 2.409845     | 2.719624     | 13 |
| 14 | 1.979932    | 2.260904     | 2.578534     | 2.937194     | 14 |
| 15 | 2.078928    | 2.396558     | 2.759031     | 3.172169     | 15 |
| 16 | 2.182875    | 2.540352     | 2.952164     | 3.425943     | 16 |
| 17 | 2.292018    | 2.692773     | 3.158815     | 3.700018     | 17 |
| 18 | 2.406619    | 2.854339     | 3.379932     | 3.996019     | 18 |
| 19 | 2.526950    | 3.025599     | 3.616527     | 4.315701     | 19 |
| 20 | 2.653298    | 3.207135     | 3.869684     | 4.660957     | 20 |
|    | 9 per cent. | 10 per cent. | 11 per cent. | 12 per cent. |    |
| 1  | 1.090000    | 1.100000     | 1.110000     | 1.120000     | 1  |
| 2  | 1.188100    | 1.210000     | 1.232100     | 1.254400     | 2  |
| 3  | 1.295029    | 1.331000     | 1.367631     | 1.404908     | 3  |
| 4  | 1.411582    | 1.464100     | 1.518070     | 1.573519     | 4  |
| 5  | 1.538624    | 1.610510     | 1.685058     | 1.762342     | 5  |
| 6  | 1.677100    | 1.771561     | 1.870414     | 1.973822     | 6  |
| 7  | 1.828039    | 1.948717     | 2.076160     | 2.210681     | 7  |
| 8  | 1.992563    | 2.143589     | 2.304537     | 2.475963     | 8  |
| 9  | 2.171893    | 2.357948     | 2.558036     | 2.773078     | 9  |
| 10 | 2.367364    | 2.593742     | 2.839420     | 3.105848     | 10 |
| 11 | 2.580426    | 2.853117     | 3.151757     | 3.478549     | 11 |
| 12 | 2.812665    | 3.138428     | 3.498450     | 3.895975     | 12 |
| 13 | 3.065805    | 3.452271     | 3.883279     | 4.363492     | 13 |
| 14 | 3.341727    | 3.797493     | 4.310440     | 4.887111     | 14 |
| 15 | 3.642482    | 4.177248     | 4.784588     | 5.473565     | 15 |
| 16 | 3.970306    | 4.594973     | 5.310893     | 6.130392     | 16 |
| 17 | 4.327633    | 5.054470     | 5.895091     | 6.866040     | 17 |
| 18 | 4.717120    | 5.559917     | 6.543551     | 7.689964     | 18 |
| 19 | 5.141661    | 6.115909     | 7.263342     | 8.612760     | 19 |
| 20 | 5.604411    | 6.727500     | 8.062309     | 9.646201     | 20 |

394. To find the amount of any sum by the tables.

*Rule.*—Multiply the amount of \$1 for the given rate and time by the given principal.

*EXAMPLE.*—What will be the amount of \$500 for 10 years, at 6% compound interest?

$$\text{Amount of \$1 for 10 years at 6\%} = 1.790848$$

$$\text{Amount of \$500} = \frac{500}{1.790848} = \$895.424000$$

$$\$895.42 - \$500 = \$395.42, \text{ the compound interest.}$$

395. When the time extends beyond the limits of the table, find the amount for a convenient length of time, and use this amount for a new principal for the remainder of the time.

*EXAMPLE.*—\$1.790848, amount for 10 years, at 6%, multiplied by 1.338226, amount for 5 years, equals \$2.396558, amount for 15 years.

396. When the intervals are less than a year, find how many such intervals occur in 1 year, and divide the given rate by the number of intervals thus found; then under the rate shown by the quotient, and opposite the number showing the total number of intervals will be found the amount.

EXAMPLES.

1. The amount of \$800 for 3 years at 6% compound interest, payable semi-annually, is the same as the amount of \$800 at 3% for 6 years, payable annually. If the interest was payable quarterly, it would be the same as the amount of \$800 for 12 years at 1½%; if payable monthly, the same as for 36 years at ½%.

2. What is the compound interest of \$950 for 3 years 6 months, at 12%, payable semi-annually?

3. What is the compound interest of \$4600 for 2 years, interest payable quarterly, at 6% per annum?

397. *Compound Interest, and also the Compound Amount, vary in proportion to the principal.*

398. To find the principal or present worth at compound interest, the amount, time, and rate per cent. being given.

**Rule.**—Divide the given amount by the compound amount of \$1 for the given time and rate.

## EXAMPLES.

1. What is the present worth of \$306.26, due 3 years hence, at 7% compound interest?

*Amount of \$1 for 3 years at 7%, \$1.225043.*

$$\$306.26 \div 1.225043 = \$250. \quad \text{Ans. } \$250.$$

2. What principal at compound interest will amount to \$2375.92 in 14 years at 5%? Ans. \$1200.

3. What is the present worth of \$5036.34 due 12 years hence at 8% compound interest?

**399.** To find the principal or present worth, the compound interest, the time, and the rate per cent. being given.

**Rule.**—Divide the given interest by the compound interest on \$1 for the given time and rate.

## EXAMPLES.

1. What principal at 7% compound interest will produce \$351.81 in 15 years?

*Compound interest of \$1 for 15 years at 7% = \$1.759031.*

$$\$351.81 \div 1.759031 = \$200. \quad \text{Ans. } \$200.$$

2. What principal will yield \$7351.52 in 27 years at  $3\frac{1}{2}\%$  compound interest? Ans. \$4800.

3. What principal at 6% compound interest will yield \$885.67+ in 12 years? Ans. \$875.

**400.** To find the time or rate, when the other quantities are given.

**Rule.**—Divide the amount by the principal, and look for the quotient in the Table, under the given rate, or opposite the given time.

## EXAMPLES.

1. In what time will \$500 amount to \$709.26 at 6%?

$$\$709.26 \div 500 = 1.41852.$$

In the table, under 6% we find 1.41852 opposite 5.

*Ans.* 5 years.

2. At what rate will \$300 at compound interest amount to \$402 in 6 years?

$$\$402 \div 300 = \$1.34,$$

which we find in the table opposite 6 and under 5%.

*Ans.* 5%.

3. In what time will \$1000 amount to \$1331 at 10%?

*Ans.* 3 years.

## ANNUITIES.

**401. An Annuity** is a yearly income or sum of money to be paid regularly at stated periods.

**402. A Perpetual Annuity** is one that is unlimited in duration, or which can be terminated by the grantor only on the payment of a sum whose interest will equal the annuity.

**403. An Annuity Certain, or Terminable Annuity,** begins and ends at a fixed time.

**404. A Contingent Annuity** depends upon some particular circumstance, as the life of one or more individuals. Life Insurance, Dowers, and Pensions are of this kind.

**405. A Deferred Annuity, or Annuity in Reversion,** is one that begins at some future time.

**406. An Annuity forborne or in Arrears** is one on which the payments remain unpaid after becoming due.

**407. The Amount or Final Value** of an annuity at compound interest is the sum to which all its payments at compound interest will amount at the end of the annuity.

**408. The Present Value** of an annuity is the sum which at interest would amount to its final value.

### ANNUITIES AT SIMPLE INTEREST.

**409. To find the value of an annuity at Simple Interest.**

*Rule.*—Multiply the interest on the annuity for 1 year by the

number of years less 1, and this product by one-half the number of years; then

Add the product of the annuity multiplied by the number of years.

#### EXAMPLES.

1. What will be the amount or final value of an annuity of \$150 for 8 years at 6%?

*Interest on \$150 for 1 year = \$9.*

$$9 \times 7 = 63.$$

$$63 \times 4 = 252$$

$$150 \times 8 = 1200$$

$$\text{Ans. } \$1452$$

2. The rent of a house, which is \$300 per year, has remained unpaid for 5 years. What amount is now due, allowing interest at 7%? *Ans. \$1710.*

410. To find the present value of an annuity at Simple Interest.

*Rule.*—Find the final value of the annuity, and then find the present value of that amount.

#### EXAMPLE.

1. What is the present value of the annuity mentioned in the first example under the preceding rule?

*Final value, \$1452.*

*Present worth of \$1452 for 8 years at 6% = \$981.81.*

#### ANNUITIES AT COMPOUND INTEREST.

The amount of an annuity of \$1, at 6% compound interest, for

$$1 \text{ year} = \$1.060000.$$

$$2 \text{ yrs.} = \$1.123600.$$

$$3 \text{ " } = \$1.191016.$$

The final value of an annuity of \$1 for

| 2 years.                           | 3 years.                             | 4 years.        |
|------------------------------------|--------------------------------------|-----------------|
| \$ 1.00                            | \$ 1.0000                            | \$ 1.000000     |
| 1.06                               | 1.0600                               | 1.060000        |
| <u>\$ 2.06</u>                     | <u>1.1236</u>                        | <u>1.123600</u> |
| Final value for 3 years, \$ 3.1836 |                                      | 1.191016        |
|                                    | Final value for 4 years, \$ 4.374616 |                 |

The final value of \$300 for 4 years = \$4.374616 × 300 = \$1312.3848.

411. To find the final value of an annuity.

*Rule.*—Multiply the amount of \$1, as given in Table I, by the annuity: the product will be the final value.

412. To find the present value of an annuity.

*Rule.*—Divide the amount or final value of the annuity by the amount of \$1 at compound interest. Or,

Multiply the present worth of \$1, as given in Table II., by the given annuity.

**EXAMPLE.**—Find the present worth of an annuity of \$1 for 3 years at 6%.

The final value of \$1 for 3 years = \$3.1836. Then, by Art. 398, Compound Interest, the present value of an annuity of \$1 for 3 years = \$3.1836 ÷ 1.191016 = \$2.673012.

The present value of \$500, at the same rate, for the same time, would be \$2.673012 × 500 = \$1336.506.

413. To find the present value of an annuity in reversion.

*Rule.*—Find the present value of an annuity of \$1 to the time the annuity commences, and also to the time it terminates; then multiply the difference between these present values by the given annuity. Or,

Find the present worth of the final value of the annuity from the present time to the time it terminates.

TABLE I.

Showing the Final Value of an Annuity of One Dollar per annum, at Compound Interest, from 1 year to 40, inclusive.

| Yrs. | 3%.        | 3½%.       | 4%.        | 5%.         | 6%.         | 7%.         |
|------|------------|------------|------------|-------------|-------------|-------------|
| 1    | 1.000 000  | 1.000 000  | 1.000 000  | 1.000 000   | 1.000 000   | 1.000 000   |
| 2    | 2.030 000  | 2.035 000  | 2.040 000  | 2.050 000   | 2.060 000   | 2.070 000   |
| 3    | 3.090 900  | 3.106 225  | 3.121 600  | 3.152 500   | 3.183 600   | 3.214 900   |
| 4    | 4.183 627  | 4.214 943  | 4.246 464  | 4.310 125   | 4.374 616   | 4.439 943   |
| 5    | 5.309 136  | 5.362 466  | 5.416 323  | 5.525 631   | 5.637 093   | 5.750 739   |
| 6    | 6.468 410  | 6.550 152  | 6.632 975  | 6.801 913   | 6.975 319   | 7.153 291   |
| 7    | 7.662 462  | 7.779 408  | 7.898 294  | 8.142 008   | 8.393 838   | 8.654 021   |
| 8    | 8.892 386  | 9.051 687  | 9.214 226  | 9.549 109   | 9.897 468   | 10.259 803  |
| 9    | 10.159 106 | 10.368 496 | 10.582 795 | 11.026 564  | 11.491 316  | 11.977 989  |
| 10   | 11.463 879 | 11.731 393 | 12.006 107 | 12.577 893  | 13.180 795  | 13.816 448  |
| 11   | 12.807 796 | 13.141 992 | 13.486 351 | 14.206 787  | 14.971 643  | 15.783 599  |
| 12   | 14.192 030 | 14.601 962 | 15.025 805 | 15.917 127  | 16.869 941  | 17.888 451  |
| 13   | 15.617 790 | 16.113 030 | 16.626 838 | 17.712 983  | 18.882 138  | 20.140 643  |
| 14   | 17.086 324 | 17.676 986 | 18.291 911 | 19.598 632  | 21.015 066  | 22.550 488  |
| 15   | 18.598 914 | 19.295 981 | 20.023 588 | 21.578 564  | 23.275 970  | 25.129 022  |
| 16   | 20.156 881 | 20.971 030 | 21.824 531 | 23.657 492  | 25.670 528  | 27.888 054  |
| 17   | 21.761 588 | 22.705 016 | 23.697 512 | 25.840 366  | 28.212 880  | 30.840 217  |
| 18   | 23.414 435 | 24.499 691 | 25.645 413 | 28.132 385  | 30.905 653  | 33.999 033  |
| 19   | 25.116 868 | 26.357 180 | 27.671 229 | 30.539 004  | 33.759 992  | 37.378 965  |
| 20   | 26.870 374 | 28.279 682 | 29.778 079 | 33.065 954  | 36.785 591  | 40.995 492  |
| 21   | 28.676 486 | 30.269 471 | 31.969 202 | 35.719 252  | 39.992 727  | 44.865 177  |
| 22   | 30.536 780 | 32.328 902 | 34.247 970 | 38.505 214  | 43.392 290  | 49.005 739  |
| 23   | 32.452 884 | 34.460 414 | 36.617 889 | 41.430 475  | 46.995 828  | 53.436 141  |
| 24   | 34.426 470 | 36.666 528 | 39.082 604 | 44.501 999  | 50.815 577  | 58.176 671  |
| 25   | 36.459 264 | 38.949 857 | 41.645 908 | 47.727 099  | 54.864 512  | 63.249 030  |
| 26   | 38.553 042 | 41.318 102 | 44.311 745 | 51.113 454  | 59.156 383  | 68.676 470  |
| 27   | 40.709 634 | 42.759 060 | 47.084 214 | 54.669 126  | 63.705 766  | 74.483 823  |
| 28   | 42.930 923 | 46.290 627 | 49.967 583 | 58.402 583  | 68.528 112  | 80.697 691  |
| 29   | 45.218 850 | 48.910 799 | 52.966 286 | 62.322 712  | 73.639 798  | 87.346 529  |
| 30   | 47.575 416 | 51.622 677 | 56.084 938 | 66.438 848  | 79.058 186  | 94.460 786  |
| 31   | 50.002 678 | 54.429 471 | 59.328 335 | 70.760 790  | 84.801 677  | 102.073 041 |
| 32   | 52.502 759 | 57.334 502 | 62.701 469 | 75.298 829  | 90.899 778  | 110.218 154 |
| 33   | 55.077 841 | 60.341 210 | 66.209 527 | 80.063 771  | 97.343 165  | 118.993 425 |
| 34   | 57.730 177 | 63.453 152 | 69.857 909 | 85.066 959  | 104.183 755 | 128.258 765 |
| 35   | 60.462 082 | 66.674 013 | 73.652 225 | 90.320 307  | 111.434 780 | 138.226 878 |
| 36   | 63.271 944 | 70.007 603 | 77.598 314 | 95.836 323  | 119.120 867 | 148.913 460 |
| 37   | 66.174 223 | 73.457 869 | 81.702 246 | 101.628 139 | 127.268 119 | 160.337 400 |
| 38   | 69.159 449 | 77.028 895 | 85.970 336 | 107.709 546 | 135.904 206 | 172.561 020 |
| 39   | 72.234 233 | 80.724 906 | 90.409 150 | 114.085 023 | 145.058 458 | 185.640 232 |
| 40   | 75.401 260 | 84.550 278 | 95.025 516 | 120.799 774 | 154.761 966 | 199.635 112 |



TABLE II.

Showing the Present Worth of an Annuity of One Dollar per annum, at Compound Interest, from 1 year to 40, inclusive.

| Yrs. | 3%.        | 3½%.       | 4%.        | 5%.        | 6%.        | 7%.        | Yrs. |
|------|------------|------------|------------|------------|------------|------------|------|
| 1    | 0.970 874  | 0.966 184  | 0.961 588  | 0.952 381  | 0.943 396  | 0.934 579  | 1    |
| 2    | 1.913 470  | 1.899 694  | 1.886 095  | 1.859 410  | 1.838 398  | 1.808 017  | 2    |
| 3    | 2.828 611  | 2.801 637  | 2.775 091  | 2.723 248  | 2.673 012  | 2.624 314  | 3    |
| 4    | 3.717 096  | 3.673 079  | 3.629 896  | 3.545 951  | 3.465 106  | 3.387 209  | 4    |
| 5    | 4.579 707  | 4.515 052  | 4.451 822  | 4.329 477  | 4.212 364  | 4.100 196  | 5    |
| 6    | 5.417 191  | 5.328 558  | 5.242 137  | 5.075 692  | 4.917 824  | 4.766 587  | 6    |
| 7    | 6.230 283  | 6.114 544  | 6.002 055  | 5.786 873  | 5.582 881  | 5.389 286  | 7    |
| 8    | 7.019 692  | 6.873 956  | 6.732 745  | 6.463 213  | 6.209 744  | 5.971 296  | 8    |
| 9    | 7.786 109  | 7.607 687  | 7.435 832  | 7.107 822  | 6.801 692  | 6.515 228  | 9    |
| 10   | 8.530 203  | 8.316 605  | 8.110 896  | 7.721 735  | 7.360 087  | 7.023 577  | 10   |
| 11   | 9.252 624  | 9.001 551  | 8.760 477  | 8.306 414  | 7.886 875  | 7.498 669  | 11   |
| 12   | 9.954 004  | 9.663 334  | 9.385 074  | 8.863 252  | 8.383 844  | 7.942 671  | 12   |
| 13   | 10.634 955 | 10.302 788 | 9.985 648  | 9.393 578  | 8.852 683  | 8.357 635  | 13   |
| 14   | 11.296 073 | 10.920 520 | 10.563 123 | 9.898 641  | 9.294 984  | 8.745 452  | 14   |
| 15   | 11.937 985 | 11.517 411 | 11.118 387 | 10.379 658 | 9.712 249  | 9.107 898  | 15   |
| 16   | 12.561 102 | 12.094 117 | 11.652 296 | 10.837 770 | 10.105 895 | 9.446 632  | 16   |
| 17   | 13.166 118 | 12.651 321 | 12.165 669 | 11.274 066 | 10.477 260 | 9.763 206  | 17   |
| 18   | 13.753 513 | 13.189 682 | 12.659 297 | 11.689 587 | 10.827 603 | 10.059 070 | 18   |
| 19   | 14.323 799 | 13.709 887 | 13.133 939 | 12.085 321 | 11.158 116 | 10.335 578 | 19   |
| 20   | 14.877 475 | 14.212 403 | 13.590 326 | 12.452 210 | 11.469 421 | 10.593 997 | 20   |
| 21   | 15.415 024 | 14.697 974 | 14.029 160 | 12.821 153 | 11.764 077 | 10.835 527 | 21   |
| 22   | 15.936 917 | 15.167 125 | 14.451 115 | 13.163 003 | 12.041 582 | 11.061 241 | 22   |
| 23   | 16.443 608 | 15.620 410 | 14.856 842 | 13.488 574 | 12.303 379 | 11.272 187 | 23   |
| 24   | 16.935 542 | 16.058 368 | 15.246 963 | 13.798 642 | 12.550 858 | 11.469 834 | 24   |
| 25   | 17.413 148 | 16.481 515 | 15.622 080 | 14.093 945 | 12.783 356 | 11.658 583 | 25   |
| 26   | 17.876 842 | 16.890 352 | 15.982 769 | 14.275 185 | 13.008 166 | 11.825 779 | 26   |
| 27   | 18.327 031 | 17.285 365 | 16.329 586 | 14.643 034 | 13.210 534 | 11.986 709 | 27   |
| 28   | 18.764 108 | 17.667 019 | 16.663 063 | 14.898 127 | 13.406 164 | 12.137 111 | 28   |
| 29   | 19.188 455 | 18.035 767 | 16.983 715 | 15.141 074 | 13.590 721 | 12.277 674 | 29   |
| 30   | 19.600 441 | 18.392 045 | 17.292 033 | 15.372 451 | 13.764 831 | 12.409 041 | 30   |
| 31   | 20.000 428 | 18.736 276 | 17.588 494 | 15.592 811 | 13.929 086 | 12.531 814 | 31   |
| 32   | 20.338 765 | 19.068 865 | 17.873 552 | 15.802 877 | 14.084 043 | 12.646 555 | 32   |
| 33   | 20.765 792 | 19.390 208 | 18.147 646 | 16.002 549 | 14.230 230 | 12.753 790 | 33   |
| 34   | 21.131 837 | 19.700 684 | 18.411 198 | 16.192 204 | 14.368 141 | 12.854 009 | 34   |
| 35   | 21.487 220 | 20.000 661 | 18.664 613 | 16.374 194 | 14.498 246 | 12.947 672 | 35   |
| 36   | 21.832 252 | 20.290 494 | 18.908 282 | 16.546 852 | 14.620 987 | 13.035 208 | 36   |
| 37   | 22.167 235 | 20.570 525 | 19.142 579 | 16.711 287 | 14.736 780 | 13.117 017 | 37   |
| 38   | 22.492 462 | 20.841 087 | 19.367 864 | 16.867 893 | 14.846 619 | 13.193 473 | 38   |
| 39   | 22.806 215 | 21.102 500 | 19.584 485 | 17.017 041 | 14.949 075 | 13.264 928 | 39   |
| 40   | 23.114 772 | 21.355 072 | 19.792 774 | 17.159 086 | 15.046 297 | 13.331 709 | 40   |

414. To find the present worth of an annuity in perpetuity.

This is equivalent to finding a principal the interest of which is equal to the given annuity.

*Rule.*—*Annex two ciphers to the annuity, and divide by the rate.*

EXAMPLE.—The annual income from an estate is \$250. What is the present worth of the estate, allowing interest, at 6% ? *Ans.* \$4166.666.

415. To find an annuity from its present value.

*Rule.*—*Divide its present value by the present value of an annuity of \$1 for the given rate and time.*

EXAMPLE.—The present value of an annuity for 10 years, at 5% compound interest, is \$3000. What is the annuity ? *Ans.* \$388.513.

416. To find an annuity from its amount.

*Rule.*—*Divide the given amount by the amount of \$1 for the given time and rate.*

EXAMPLE.—The final value of an annuity for 11 years, at 7% compound interest, amounts to \$4735.08. What is the annuity ? *Ans.* \$300.

#### MISCELLANEOUS EXAMPLES.

1. What sum of money must a man invest annually at 6% compound interest, that he may have \$5000 at the end of 10 years ?

2. What is the present worth of \$500 to be received annually for 6 years, allowing compound interest at 7% ?

3. What sum invested at 6% compound interest will yield an income of \$1800 per annum for 12 years ?

4. The executors of an estate offer for sale an unoccupied lease that has six years to run, for a premium of \$300. How much, added to the annual rent, will amount to the same sum ?

## LIFE INSURANCE.



417. Life Insurance companies base their premiums upon the number of years each person is expected to live after insuring, and the use of money for that time.

418. The expectation of life is the *average* number of years remaining to a person at a given age, and is deduced from tables of mortality, which have been prepared from various observations made in different places and periods, showing, out of a given number of persons, how many complete each subsequent year, and how many die in it, till the whole are extinct.

The Carlisle tables, formed by Mr. Milne according to the mortality observed at Carlisle (Eng.), the Northampton tables, formed by Dr. Price (Eng.), the Wigglesworth tables, prepared by Dr. Wigglesworth from data founded upon the mortality of this country, and others, are employed. The Carlisle tables are in general use in England, and to a considerable extent here. The Wigglesworth tables have been adopted by the Supreme Court of Massachusetts in estimating life estates: they show a smaller expectation of life than the Carlisle tables.

419. The probability that a person of any designated age will attain any greater age is expressed by dividing the number of survivors at the greater age by the number that attain the given age. Thus, by the Carlisle tables, of 10,000 persons born together, 5642 attain to 30, and 2894 to 66 years of age. The probability that a person now 30 years will reach the age of 66 years is, therefore,  $\frac{2894}{5642}$ ,—about  $\frac{1}{2}$ , or 1 chance in 2. The value of a sum of money, the receipt of which depends upon the person being alive at that time, will be reduced by that contingency one-half; so that if the sum to be received is \$1000, its value is reduced to only \$500. The present worth of \$1000, due 36 years hence, interest at 6 per cent., is \$122.74; but, depending upon the same contingency, it is worth only \$61.37.

Table of Mortality based upon observations at Carlisle (England), showing the rate of extinction of 10,000 lives.

| Age. | Number of Survivors. | Number of Deaths. | Age. | Number of Survivors. | Number of Deaths. | Age. | Number of Survivors. | Number of Deaths. |
|------|----------------------|-------------------|------|----------------------|-------------------|------|----------------------|-------------------|
| 0    | 10000                | 1539              | 35   | 5362                 | 55                | 70   | 2401                 | 124               |
| 1    | 8461                 | 682               | 36   | 5307                 | 56                | 71   | 2277                 | 134               |
| 2    | 7779                 | 505               | 37   | 5251                 | 57                | 72   | 2143                 | 146               |
| 3    | 7274                 | 276               | 38   | 5194                 | 58                | 73   | 1997                 | 156               |
| 4    | 6998                 | 201               | 39   | 5136                 | 62                | 74   | 1841                 | 166               |
| 5    | 6797                 | 121               | 40   | 5075                 | 66                | 75   | 1675                 | 160               |
| 6    | 6676                 | 82                | 41   | 5009                 | 69                | 76   | 1515                 | 156               |
| 7    | 6594                 | 58                | 42   | 4940                 | 71                | 77   | 1359                 | 146               |
| 8    | 6536                 | 43                | 43   | 4869                 | 71                | 78   | 1213                 | 132               |
| 9    | 6493                 | 33                | 44   | 4798                 | 71                | 79   | 1081                 | 128               |
| 10   | 6460                 | 29                | 45   | 4727                 | 70                | 80   | 953                  | 116               |
| 11   | 6431                 | 31                | 46   | 4657                 | 69                | 81   | 837                  | 112               |
| 12   | 6400                 | 32                | 47   | 4588                 | 67                | 82   | 725                  | 102               |
| 13   | 6368                 | 33                | 48   | 4521                 | 63                | 83   | 623                  | 94                |
| 14   | 6335                 | 35                | 49   | 4458                 | 61                | 84   | 529                  | 84                |
| 15   | 6300                 | 39                | 50   | 4397                 | 59                | 85   | 445                  | 78                |
| 16   | 6261                 | 42                | 51   | 4338                 | 62                | 86   | 367                  | 71                |
| 17   | 6219                 | 43                | 52   | 4276                 | 65                | 87   | 296                  | 64                |
| 18   | 6176                 | 43                | 53   | 4211                 | 68                | 88   | 232                  | 51                |
| 19   | 6133                 | 43                | 54   | 4143                 | 70                | 89   | 181                  | 39                |
| 20   | 6090                 | 43                | 55   | 4073                 | 73                | 90   | 142                  | 37                |
| 21   | 6047                 | 42                | 56   | 4000                 | 76                | 91   | 105                  | 30                |
| 22   | 6005                 | 42                | 57   | 3924                 | 82                | 92   | 75                   | 21                |
| 23   | 5963                 | 42                | 58   | 3842                 | 93                | 93   | 54                   | 14                |
| 24   | 5921                 | 42                | 59   | 3749                 | 106               | 94   | 40                   | 10                |
| 25   | 5879                 | 43                | 60   | 3643                 | 122               | 95   | 30                   | 7                 |
| 26   | 5836                 | 43                | 61   | 3521                 | 126               | 96   | 23                   | 5                 |
| 27   | 5793                 | 45                | 62   | 3395                 | 127               | 97   | 18                   | 4                 |
| 28   | 5748                 | 50                | 63   | 3268                 | 125               | 98   | 14                   | 3                 |
| 29   | 5698                 | 56                | 64   | 3143                 | 125               | 99   | 11                   | 2                 |
| 30   | 5642                 | 57                | 65   | 3018                 | 124               | 100  | 9                    | 2                 |
| 31   | 5585                 | 57                | 66   | 2894                 | 123               | 101  | 7                    | 2                 |
| 32   | 5528                 | 56                | 67   | 2771                 | 123               | 102  | 5                    | 2                 |
| 33   | 5472                 | 55                | 68   | 2648                 | 123               | 103  | 3                    | 2                 |
| 34   | 5417                 | 55                | 69   | 2525                 | 124               | 104  | 1                    | 1                 |

EXAMPLE.—If a person whose probability of life is 14.34 years inherits an estate having a rental value of \$1000 per annum, the present worth of the annuity of \$1000 for that term is  $9.4368 \times 1000 = \$9436.80$ ,—the valuation on which he is taxed.

**420.** The expectation of life may be obtained by finding the *sum of the probabilities* that the person will live to the extreme limit of life, plus  $\frac{1}{2}$ . The  $\frac{1}{2}$  is added on the supposition that, on an average, the life will fail at the middle of the year. Thus, by the table, the probability that a person at 102 will live one year is  $\frac{2}{3}$ , that he will live 2 years is  $\frac{1}{3}$ :  $\frac{2}{3} + \frac{1}{3} + \frac{1}{2} = 1\frac{1}{6} = 1.30$  years. It may also be found by dividing the aggregate number of years which the persons who are alive at one time will live, by the number of persons. A short rule, which gives approximate results, is to take  $\frac{2}{3}$  of the number of years between the person's present age and 80. Thus, a person at 20 has an expectation of 40 years; at 50, of 20 years.

The value of the probabilities and expectation of life under various circumstances is calculated by actuaries, and involves complications too extensive for an elementary work. From these calculations, tables are arranged, showing the rates at which companies will insure lives,—such rates including all probable losses, expenses, interest, and profits.

To all who have limited incomes, Life Insurance offers a provision against the accidents of life. By paying a small sum annually, a person at his death may leave his family—which would otherwise be dependent, either from lack of property, or from having heavily encumbered property—in comfortable circumstances.

By a **Joint Policy**, two persons may insure, and the sum insured is paid to the other on the death of either. By the **Endowment Policy**, the amount can be made payable to the person insured at a stated time,—thus making provision against old age. A Life Insurance policy has enabled persons of unquestionable character and business ability, who have otherwise been unable to borrow on account of advanced age and the uncertainty of life, to obtain capital with which to conduct a profitable business.

*Extract from Instructions issued by the Treasury Department, Washington, February 15, 1866.*

"Where legacies are made payable at the expiration of a life or lives in being, the value of the legacy will be estimated by the Carlisle tables of life annuities.

"Where a legacy is made payable on a future contingency, the value of the legacy is to be estimated by a consideration of the time, certain or ascertainable by the annuity tables, when the legacy will become vested.

VALUE OF LIFE INTERESTS, WIDOWS' DOWERS,  
ANNUITIES, ETC.

## Carlisle Tables.

| Age. | Expectancy of life in years and hundredths. | Present value of annuity of \$1.00 for the number of years and 100ths of years found in 2d column, at 6 per cent. | Present value of \$1.00 to be received at the end of the number of years and 100ths of years as found in 2d column, interest at 6 per cent. | Age. | Expectancy of life in years and hundredths. | Present value of annuity of \$1.00 for the number of years and 100ths of years found in 2d column, at 6 per cent. | Present value of \$1.00 to be received at the end of the number of years and 100ths of years as found in 2d column, interest at 6 per cent. |
|------|---|---|---|------|---|---|---|
| 0    | 38.72                                       | 14.9202   | .104788   | 41   | 26.97                                       | 13.2043   | .207741   |
| 1    | 44.68                                       | 15.4325   | .074065   | 42   | 26.34                                       | 13.0737   | .215580   |
| 2    | 47.55                                       | 15.6225   | .062645   | 43   | 25.71                                       | 12.9395   | .223635   |
| 3    | 49.82                                       | 15.7521   | .054874   | 44   | 25.09                                       | 12.8032   | .231812   |
| 4    | 50.76                                       | 15.8008   | .051953   | 45   | 24.46                                       | 12.6576   | .240548   |
| 5    | 51.25                                       | 15.8252   | .050490   | 46   | 23.82                                       | 12.5059   | .249646   |
| 6    | 51.17                                       | 15.8213   | .050722   | 47   | 23.17                                       | 12.3454   | .259278   |
| 7    | 50.80                                       | 15.8029   | .051830   | 48   | 22.51                                       | 12.1751   | .269494   |
| 8    | 50.24                                       | 15.7742   | .053551   | 49   | 21.81                                       | 11.9889   | .280069   |
| 9    | 49.57                                       | 15.7385   | .055689   | 50   | 21.11                                       | 11.7946   | .292324   |
| 10   | 48.82                                       | 15.6972   | .058168   | 51   | 20.39                                       | 11.5846   | .304922   |
| 11   | 48.04                                       | 15.6523   | .060860   | 52   | 19.68                                       | 11.3701   | .317792   |
| 12   | 47.27                                       | 15.6055   | .063670   | 53   | 18.97                                       | 11.1481   | .331108   |
| 13   | 46.51                                       | 15.5573   | .066559   | 54   | 18.28                                       | 10.9201   | .344791   |
| 14   | 45.75                                       | 15.5072   | .069566   | 55   | 17.58                                       | 10.6805   | .359172   |
| 15   | 45.00                                       | 15.4558   | .072650   | 56   | 16.89                                       | 10.4364   | .373815   |
| 16   | 44.27                                       | 15.4028   | .075832   | 57   | 16.21                                       | 10.1839   | .388967   |
| 17   | 43.57                                       | 15.3501   | .078996   | 58   | 15.55                                       | 9.9287  | .404275   |
| 18   | 42.87                                       | 15.2956   | .082267   | 59   | 14.92                                       | 9.6788  | .419268   |
| 19   | 42.17                                       | 15.2384   | .085695   | 60   | 14.34                                       | 9.4368  | .433789   |
| 20   | 41.46                                       | 15.1778   | .089331   | 61   | 13.82                                       | 9.2154  | .447078   |
| 21   | 40.75                                       | 15.1151   | .093095   | 62   | 13.31                                       | 8.9900  | .460612   |
| 22   | 40.04                                       | 15.0500   | .097002   | 63   | 12.81                                       | 8.7636  | .474183   |
| 23   | 39.31                                       | 14.9972   | .101248   | 64   | 12.30                                       | 8.5245  | .488530   |
| 24   | 38.59                                       | 14.9068   | .105592   | 65   | 11.79                                       | 8.2798  | .503231   |
| 25   | 37.86                                       | 14.8307   | .110157   | 66   | 11.27                                       | 8.0211  | .518737   |
| 26   | 37.14                                       | 14.7521   | .114876   | 67   | 10.75                                       | 7.7552  | .534690   |
| 27   | 36.41                                       | 14.6685   | .119892   | 68   | 10.23                                       | 7.4813  | .551125   |
| 28   | 35.69                                       | 14.5829   | .125024   | 69   | 9.70  | 7.1926  | .568446   |
| 29   | 35.00                                       | 14.4982   | .130105   | 70   | 9.18  | 6.9022  | .585867   |
| 30   | 34.34                                       | 14.4123   | .135258   | 71   | 8.65  | 6.5945  | .604328   |
| 31   | 33.68                                       | 14.3240   | .140560   | 72   | 8.16  | 6.3045  | .621730   |
| 32   | 33.03                                       | 14.2343   | .145938   | 73   | 7.72  | 6.0341  | .637953   |
| 33   | 32.36                                       | 14.1366   | .151789   | 74   | 7.33  | 5.7894  | .652634   |
| 34   | 31.68                                       | 14.0344   | .157932   | 75   | 7.01  | 5.5687  | .664681   |
| 35   | 31.00                                       | 13.9291   | .164255   | 76   | 6.69  | 5.3762  | .677427   |
| 36   | 30.32                                       | 13.8174   | .170957   | 77   | 6.40  | 5.1833  | .688999   |
| 37   | 29.64                                       | 13.7021   | .178079   | 78   | 6.12  | 4.9971  | .700173   |
| 38   | 28.96                                       | 13.5833   | .185000   | 79   | 5.80  | 4.7763  | .713420   |
| 39   | 28.28                                       | 13.4579   | .192530   | 80   | 5.51  | 4.5719  | .725687   |
| 40   | 27.61                                       | 13.3289   | .200208   | 81   | 5.21  | 4.3604  | .738376   |

## BUILDING AND LOAN ASSOCIATIONS.

**421.** Building and Loan Associations have for their object the accumulation of a fund from which the members can obtain the means to build or buy houses, purchase lands, or for similar purposes.

The shares are usually estimated at \$200 each, and are paid for in monthly instalments, generally \$1 per month for each share. When the accumulated payments reach a certain sum, the funds are offered at auction, and given to the shareholder paying the largest bonus or discount. Interest on the loan thus made is paid monthly, or at the same time as the periodical dues. The loans are generally secured by mortgage on real estate. To prevent delinquency, fines are imposed of 2 to 5 per cent. per month on all sums not paid when due. When the total amount received by the association is sufficient to give each shareholder the amount originally agreed upon, the association closes.

As promotive of habits of economy, and as affording means of profitable investment, these associations have been highly successful. The chief benefit, however, is derived from the increase in the value of the property purchased, and in the convenient form in which the payments are made. Practically, these associations have given homes to hundreds who would otherwise never have owned them.

**422.** To find the cost of a share at simple interest, when the monthly dues, time, and rate of interest are given.

*Rule.*—Multiply the interest on the monthly payment for one month by the number of months, less 1, that the association continues, and this product by one-half the number of months the association continues. Then

Add the product of the monthly payment by the total number of months.

## EXAMPLE.

What was the cost of a share for which \$1 per month had been paid for 9 years, allowing 6% simple interest?

Interest on \$1 for 1 month, .005.  $108 - 1 = 107$

Number of months in 9 years = 108.  $108 \div 2 = 54$

$107 \times .005 = .535$ .  $.535 \times 54 = 28.890$

$\$1. \times 108 = 108.000$

Total cost, allowing 6% interest, \$136.890

**423. To find the cost of a share at compound interest.**

*Rule.*—Divide the monthly payment, after annexing two ciphers, by the given rate of interest, and find the compound interest of the quotient for the given rate and time.

**424. To find the cost of a loan at simple interest.**

*Rule.*—Add the present value of a share to the present value of the payment required for the loan.

As it is impossible before the association closes, owing to the variations of discounts, number of borrowers, etc., to know the exact time the association will continue, an *approximate value* is all that can be found. From eight to ten years is the usual time.

**EXAMPLES.**

1. What is the cost of a loan of \$200, the association requiring \$1 interest in addition to \$1 as regular payment to be paid monthly for 6 years, the present value of a share being \$50?

Interest on \$2 for 1 month = .01.

6 years = 72 months.  $.01 \times 71 = 71\text{¢}$ .

$71 \times 36 = \$25.56$

$\$2 \times 72 = 144.00$

Value of payments to be made, \$169.56

Present worth of payments for 6 years, \$124.26

Value of share, 50

Cost of loan, \$174.26 Ans.

A bonus of 10% on \$200 would leave \$180. A bonus of 20% would leave \$160.

2. Which would be preferable, the above loan and payments, or to borrow \$180 at 6% compound interest?



425. To find the rate of interest paid for a loan.

*Rule.*—*Subtract the amount received from the total amount paid in. Then,*

*Find the rate it will require for the loan to gain this difference in the given number of years. (See Art. 237, page 133.)*

426. To find the amount of fines on dues remaining unpaid.

*Rule.*—*Multiply the sum unpaid each month by the rate of fine, and add the results of the several months.*

**Note.**—In Pennsylvania, it has been decided that fines on unpaid fines cannot be legally collected unless especially provided for in the by-laws.

**EXAMPLE.**—How much must a man whose dues are \$5 per month pay for fines at 2% per month, after his dues remain unpaid 6 months?

| 1 mo. dues unpaid, \$5 | Fines, .10 | Dues and fines, \$5.10 |
|------------------------|------------|------------------------|
| 2 " " 10               | " .20      | " " 10.30              |
| 3 " " 15               | " .30      | " " 15.60              |
| 4 " " 20               | " .40      | " " 21.00              |
| 5 " " 25               | " .50      | " " 26.50              |
| 6 " " 30               | " .60      | " " 32.10              |
|                        | \$2.10     |                        |

427. In some associations, where there are two or more series, the value of the shares in each of the different series is found at the close of each year by allowing interest on the value of each series at the beginning of the year, and then deducting this interest from the gains of the association for the year, after which the remainder of the gains is divided equally among the shares of all the different series.

For example, an association has three series. There are 400 shares in the first series, which, at the commencement of the year, were worth \$45; 300 shares in the second, worth \$33, and 100 shares of the third, worth \$16.

The gains for the whole year are \$3570

|                                 |                |           |               |          |               |
|---------------------------------|----------------|-----------|---------------|----------|---------------|
| Interest on \$45                | one year at 6% | = \$2.70, | on 400 shares | = \$1080 |               |
| "                               | " 33           | "         | "             | = 1.98,  | " 300 " = 594 |
| "                               | " 16           | "         | "             | = .96,   | " 100 " = 96  |
| Profits to be divided among 800 |                |           |               | "        | = \$1800      |

Each share, \$2.25.

|                           |                        |                       |
|---------------------------|------------------------|-----------------------|
| First series, \$45.00     | Second series, \$33.00 | Third series, \$16.00 |
| Interest 1 year, 2.70     | Interest 1 year, 1.98  | Interest 1 year, .96  |
| Equal gain, 2.25          | Equal gain, 2.25       | Equal gain, 2.25      |
| Value of 1 share, \$49.95 | \$37.23                | \$19.21               |

| Value of shares on the first of the year: |  | Value of shares at close of the year: |
|---|--|---------------------------------------|
| 400 shares @ \$45 = \$18,000              |  | 400 shares @ \$49.95 = \$19,980.00    |
| 300 " " 33 = 9,900                        |  | 300 " " 37.23 = 11,169.00             |
| 100 " " 16 = 1,600                        |  | 100 " " 19.21 = 1,921.00              |
| 800 " worth \$29,500                      |  | \$33,070.00                           |
| Gains for the year, 3,570                 |  |                                       |
| \$33,070                                  |  |                                       |

## SQUARES AND SQUARE ROOT.

**428.** The square of a number is the product of that number multiplied by itself. Thus, 36 is the square of 6,  $6 \times 6 = 36$ ; 25 is the square of 5. The square of a number is indicated by writing a small 2 at the right of the number; thus,  $3^2$  indicates the square of 3.

**429.** The square of a fraction is obtained in the same manner. The square of  $\frac{2}{3} = \frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$ .

**430.** The Square Root of a number is the factor which multiplied by itself will produce that number. Thus, the square root of 36 is 6, because 6 multiplied by itself gives as a product 36. The square root is denoted by the Radical Sign  $\sqrt{\quad}$  before the number. Thus,  $\sqrt{81}$  denotes the square root of 81, and is equal to 9.

**431. A Perfect Square** is a number which is the product of two equal factors, and which has an exact square root.

**432. To find the square root of a number.**

*Rule.*—1. Separate the given number into periods of two figures each, beginning at the place of units.

2. Find the greatest square in the left-hand period, and place its root for the first figure of the required root. Subtract the square of this figure from the left-hand period, and to the remainder annex the next period for a dividend.

3. Double the root already found, for a trial divisor; find how often it is contained in the dividend, exclusive of the right-hand figure, and place the result in the root, and also at the right of the trial divisor.

4. Multiply the complete divisor by the last figure of the root; subtract the product from the dividend, and to the remainder annex the next period for a new dividend.

5. Proceed in the same manner with all the periods to the last. The result will be the square root required.

**Note 1.**—If the given number contains a decimal, begin at the decimal point and point off into periods of two figures each towards the left in the integer, and towards the right in the decimal.

**Note 2.**—If any dividend is less than the trial divisor, place a cipher in the root, and also in the divisor; annex the next period to the dividend for a new dividend, and proceed as before.

**Note 3.**—If there is a remainder after all the periods have been used, annex periods of decimal ciphers, and carry the root to as many decimal places as may be required; four places being generally enough.

**Note 4.**—The square root of a fraction is found by extracting the square root of the numerator and of the denominator separately. If the terms of the fractions are not perfect squares, change the fraction to a decimal.

A mixed number should first be changed to an improper fraction.

#### EXAMPLES.

1. What is the square root of 50964?

23 \*

$$\begin{array}{r}
 5096\dot{4}(225.75+ \\
 \quad \quad \quad 4 \\
 42 \overline{)109} \\
 \quad \quad \quad 84 \\
 445 \overline{)2564} \\
 \quad \quad \quad 2225 \\
 4507 \overline{)33900} \\
 \quad \quad \quad 31549 \\
 45145 \overline{)235100} \\
 \quad \quad \quad 225725
 \end{array}$$

2. What is the square root of 893025? *Ans.* 945.

3. What is the square root of 294849? *Ans.* 543.

Find the square root of—

4. 676; 841; 961. | 6. 59536; 60516. | 8. 514089; 692224.

5. 1089; 2601; 3025. | 7. 77284; 96721. | 9. 881721; 996004.

10. 110.0401; 261.4689; 379.8601; 648.2116; 1041.9984.

Extract the square root of—

11.  $\frac{9}{16}$ ;  $\frac{16}{81}$ ;  $\frac{25}{49}$ . | 13.  $43\frac{1}{16}$ ;  $125\frac{1}{4}$ .

12.  $1\frac{1}{44}$ ;  $1\frac{1}{22}$ ;  $1\frac{1}{11}$ . | 14.  $72\frac{1}{4}$ ;  $365\frac{1}{4}$ .

15. Find the value of  $\sqrt{5476}$ ;  $\sqrt{.3025}$ ;  $\sqrt{42.25}$ .



## CUBES AND CUBE ROOT.

**433. The Cube of a number** is the product of that number used three times as a factor. Thus, the cube of 5 is 125, since  $5 \times 5 \times 5 = 125$ . The cube of a number is indicated by writing a small 3 at the right of the number, thus,  $6^3$ ,  $7^3$ .

**434. The Cube Root of a number** is one of its three equal factors. Thus, the cube root of 125 is 5, since  $5 \times 5 \times 5 = 125$ .

**435. A Perfect Cube** is a number which is the product of three equal factors, and which has an exact cube root.

**436. To find the Cube Root of a number.**

*Rule.*—1. Separate the given number into periods of three figures each, beginning at the place of units.

2. Find the greatest number whose cube is in the left-hand period, and place it on the right (as in a quotient) as the first figure of the root. Subtract the cube of this root from the first period, and to the remainder annex the second period for a dividend.

3. Take 300 times the square of the root already found, and place it on the left for a trial divisor. Divide the dividend by this trial divisor, and annex the result to the figure of the root already found. (If this trial divisor is greater than the dividend, annex one cipher to the root, and two ciphers to the trial divisor for the next trial divisor, and bring down the next period for a dividend.)

4. To the trial divisor add 30 times the part of the root previously found, multiplied by the last root figure, and the square of this second root figure, and use the sum so found for a complete divisor.

5. Multiply the complete divisor by the second figure in the root. Subtract the product from the dividend, and to the remainder annex the next period for a new dividend. Then proceed as before until all the periods have been used.

**Note 1.**—If the given number contains a decimal, begin at the decimal point and point off into periods of three figures each towards the *left* in the integer, and towards the *right* in the decimal.

**Note 2.**—If any dividend is less than the trial divisor, place a cipher in the root, two ciphers at the right of the trial divisor; annex the next period for a new dividend, and proceed as before.

**Note 3.**—If there is a remainder after all the periods have been used, annex periods of decimal ciphers, and carry the root to as many decimal places as may be required; three places being generally enough.

**Note 4.**—The cube root of a fraction may be found by extracting the cube root of the numerator and of the denominator separately. If the terms of the fraction are not perfect cubes, change the fraction to a decimal, and extract the cube root of the decimal.

A mixed number must first be changed to an improper fraction.

## EXAMPLES.

1. Find the cube root of 43614208.

$$3^3 = 3 \times 3 \times 3 = \begin{array}{r} 4\dot{3}61\dot{4}20\dot{8}(352 \\ 27 \\ \hline )16614 \end{array}$$

$$3 \times 3 \times 300 =$$

*Trial divisor, 2700*

$$3 \times 30 \times 5 = 450$$

$$5 \times 5 = 25$$

*Complete divisor, 3175*  $\overline{15875}$

$$35 \times 35 \times 300 = \overline{)739208}$$

*2d trial divisor, 367500*

$$35 \times 30 \times 2 = 2100$$

$$2 \times 2 = \underline{4} \quad \overline{739208}$$

*2d complete divisor, 369604*

2. What is the cube root of 91125? of 4965203816?

*Ans.* 45; 1706.

3. What is the cube root of 1860867? of 250047? of 46268279?

*Ans.* 123; 63; 359.

Extract the cube root of—

$$4. 216; 343; 512. \quad | \quad 6. 68921; 74088. \quad | \quad 8. 41063625.$$

$$5. 729; 1728; 2197. \quad | \quad 7. 85184; 91125. \quad | \quad 9. 130323843$$

$$10. 12.167; 39.304; 259.694072; .015625.$$

$$11. \frac{27}{64}; \frac{64}{125}; \frac{729}{2744}; \frac{1728}{10648}; 42\frac{2}{3}; 34\frac{3}{4}; 166\frac{191}{216}; 10\frac{1}{2}.$$



# MENSURATION AND PRACTICAL MEASUREMENTS.



**Mensuration** is the process of finding the lengths of lines, the areas of surfaces, and the volumes of solids.

## 437. LINES.

A **Line** is that which has length only.

A **Right Line** is a line whose direction does not change at any point.

A **Curved Line** is a line whose direction changes at every point.

**Parallel Lines** are lines which have the same direction.

A **Perpendicular Line** is a right line which meets another so as to incline no more towards one side than towards the other.

A **Horizontal Line** is a right line parallel to the horizon or water-level.

A **Vertical Line** is a right line perpendicular to a horizontal line.

## 438. ANGLES.


An **Angle** is the opening between two right lines meeting in a common point, called the *Vertex*.

Angles are of three kinds—*Right Angle*, *Obtuse Angle*, and *Acute Angle*.

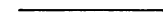
A **Right Angle** is an angle formed by two right lines that are perpendicular to each other.


An **Obtuse Angle** is greater than a right angle.


An **Acute Angle** is less than a right angle.


  
Right Line.


  
Curved Lines.

  
Parallel Lines.

  
Perpendicular Line.  
Horizontal Line.

  
Right Angle.

  
Obtuse Angle.

  
Acute Angle.

## 439. PLANE FIGURES.

A **Plane**, or **Plane Surface**, is a surface which is everywhere perfectly flat or even.

A **Plane Figure** is a plane surface bounded by right or curved lines.

The **Base** of a figure is the side on which it is supposed to stand.

The **Altitude** of a figure is the perpendicular distance from the base to the opposite side or opposite angle.

The **Vertex** (plural *vertices*) is the point where the lines which form the angle meet.

The **Diagonal** of a figure is a right line which joins the vertices of any two opposite angles.

The **Perimeter** of a figure is the sum of all the sides that bound the figure.

The **Area** of a plane figure is the extent of surface within the lines which bound the figure.

A **Polygon** is a plane figure bounded by right lines.

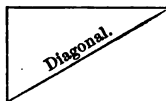
A **Regular Polygon** is one that has all of its sides equal and all of its angles equal.



## 440. THE QUADRILATERAL.

A **Quadrilateral** is a plane figure bounded by four right lines, and having four angles.

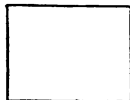
According to the nature of their sides and angles, quadrilaterals are divided into three classes; the *Parallelogram*, the *Trapezoid*, and the *Trapezium*.



Parallelogram.

A **Parallelogram** is a quadrilateral which has its opposite sides parallel.

There are four kinds of parallelograms: the *Rectangle*, the *Square*, the *Rhomboid*, and the *Rhombus*.

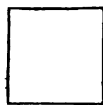


Rectangle.

A **Rectangle** is a parallelogram whose angles are all right angles.



A **Square** is a parallelogram whose sides are all equal and whose angles are all right angles.



Square.

A **Rhombus** is a parallelogram whose sides are all equal, but whose angles are not right angles.



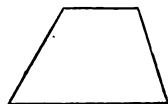
Rhombus.

A **Rhomboid** is a parallelogram whose opposite sides are equal, but whose angles are not right angles.



Rhomboid.

A **Trapezoid** is a quadrilateral which has but two of its opposite sides parallel.



Trapezoid.

A **Trapezium** is a quadrilateral which has none of its opposite sides parallel.



Trapezium.

#### 441. To find the Area of a Parallelogram.

**Rule.**—*Multiply the base by the altitude, or the length by the breadth.*

**Note.**—The sides multiplied must be of the same denomination, as either both inches or both feet, and not one side inches and the other side feet. The product will be in square units of the denomination multiplied. Thus, a room 12 yards long and 5 yards wide will contain 60 square yards.

#### EXAMPLES.

1. What is the area of a field 20 rods long and 15 rods wide?

$$15 \times 20 = 300 \quad \text{Ans. 300 sq. rods.}$$

2. How many square inches in a board 45 inches long and 12 inches wide?

$$\text{Ans. 540 sq. inches.}$$

3. How many square yards of carpet will be required to cover a floor 24 feet long and 18 feet long? *Ans.* 48 sq. yds.

4. How many rolls of paper 20 feet long and 18 inches wide will be required to cover a wall 24 feet long and  $12\frac{1}{2}$  feet high? *Ans.* 10 rolls.

5. How many square inches in a flat roof that is 28 feet long and 18 feet wide? *Ans.* 72,576 sq. inches.

6. What will it cost to pave a lot 60 feet long and 27 feet wide at \$1.50 per square yard? *Ans.* \$270.

**442. To find either side of a Parallelogram when the other Side and the Area are given.**

*Rule.*—Divide the area by the given side.

#### EXAMPLES.

1. What is the width of a lot that is 127 feet long and has an area of 10,160 square feet? *Ans.* 80 feet.

2. A merchant bought a piece of cloth 30 inches wide and containing 15 square yards. How long was it? *Ans.* 18 yards.

**443. To find the Area of a Trapezoid.**

*Rule.*—Multiply half the sum of the two parallel sides by the altitude.

#### EXAMPLES.

1. What is the area of a board 12 inches wide, one side of which is 14 inches and the other 18?

$$14 + 18 = 32. \quad \frac{1}{2} \text{ of } 32 = 16. \quad 16 \times 12 = 192$$

*Ans.* 192 square inches.

2. How many acres are there in a field, the two parallel sides being 75 and 60 rods respectively, and the distance between them being 45 rods? *Ans.* 18.98+ acres.

**444. To find the Area of a Trapezium.**

*Rule.*—Multiply the diagonal by the sum of the perpendiculars, and divide the product by 2.

## EXAMPLES.

1. What is the area of a trapezium whose diagonal is 30 feet and perpendiculars 15 feet and 10 feet?

$$15 + 10 = 25; 30 \times 25 = 750; 750 \div 2 = 325$$

Ans. 325 square feet.

2. What is the area of a trapezium whose perpendiculars are 40 and 50 feet, and whose diagonal is 70 feet?

Ans. 3150 square feet.



## 448. THE TRIANGLE.

A **Triangle** is a plane figure bounded by three right lines, and having three angles.

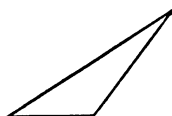
According to the nature of their *sides*, triangles are divided into three classes: *Equilateral*, *Isosceles*, and *Scalene*.



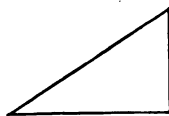
Equilateral.



Isosceles.



Scalene.



Right-Angled.

An **Equilateral Triangle** has all of its sides equal.

An **Isosceles Triangle** has but two of its sides equal.

A **Scalene Triangle** has all of its sides unequal.

According to the nature of their *angles*, triangles are divided into three classes: *Right-angled*, *Obtuse-angled*, and *Acute-angled*.

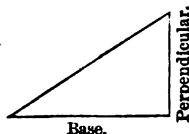
A **Right-angled Triangle** has one right angle.

An **Obtuse-angled Triangle** has one obtuse angle. The scalene is an obtuse-angled triangle.

An **Acute-angled Triangle** has all of its angles acute. The Equilateral and Isosceles are acute-angled triangles.

The **Hypotenuse** of a right-angled triangle is the side opposite to the right angle.

The two sides forming the right angle are called the **Base** and the **Perpendicular**.



**446.** To find the Area of a Triangle when the Base and the Altitude are given.

*Rule.*—Multiply the base by the altitude, and divide the product by 2.

EXAMPLES.

1. What is the area of a triangle whose base is 20 feet and altitude 16 feet?

$$20 \times 16 = 320; 320 \div 2 = 160$$

*Ans.* 160 square feet.

2. What is the area of a triangle whose base is 18 feet and altitude 10 feet?

*Ans.* 90 square feet.

3. What is the area of a triangle whose base is 24 feet and altitude 16 feet?

*Ans.* 192 square feet.

4. A board 14 feet long is 24 inches wide at one end, and tapers to a point. Find the value at  $4\frac{1}{2}$  cents per square foot.

*Ans.* 63 cents.

**447.** To find the Area of a Triangle when the Three Sides are given.

*Rule.*—From half the sum of the three sides subtract each side separately. Multiply the half sum and the three remainders together, and extract the square root of the product.

EXAMPLES.

1. What is the area of a triangle whose sides are respectively 30, 40, and 50 feet?

$$30 + 40 + 50 = 120. \quad 120 \div 2 = 60.$$

$$60 - 30 = 30. \quad 60 - 40 = 20. \quad 60 - 50 = 10.$$

$$60 \times 30 \times 20 \times 10 = 360000. \quad \sqrt{360000} = 600.$$

*Ans.* 600 square feet.

2. How many square inches in a piece of board whose sides are 13, 14, and 15 inches?

*Ans.* 84 square inches.

3. How many square feet of boards in the roof of a barn 40 feet wide, the rafters being 25 feet long?

*Ans.* 300 square feet.

**448. To find the Base or the Altitude of a Triangle when the Area and one Side are given.**

*Rule.*—Multiply the area by 2, and divide by the given side.

**EXAMPLES.**

1. The area of a triangle is 160 square feet, and the base is 20 feet. What is the altitude?

$$160 \times 2 = 320. \quad 320 \div 20 = 16. \quad \text{Ans. 16 feet.}$$

2. The area of a triangle is 90 square feet, the altitude is 10 feet. What is the length of the base? *Ans.* 18 feet.

3. At \$6 $\frac{1}{4}$  per square rod, a triangular lot cost \$1281.25. The base being 40 rods, what was the length?

$$\text{Ans. } 10\frac{1}{4} \text{ rods.}$$

**449. To find the Hypotenuse of a Right-angled Triangle.**

*Rule.*—To the square of the perpendicular add the square of the base, and extract the square root of the sum.

**EXAMPLES.**

1. What is the hypotenuse of a right-angled triangle whose perpendicular is 15 feet and base 20 feet?

$$20^2 = 400. \quad 15^2 = 225. \quad 400 + 225 = 625.$$

$$\sqrt{625} = 25. \quad \text{Ans. 25 feet.}$$

2. The perpendicular is 30 feet, base 40 feet. Required the hypotenuse. *Ans.* 50 feet.

3. The height of a gable is 16 feet, and the width of the barn is 60 feet. How long are the rafters? *Ans.* 34 feet.

**450. To find the Base or the Perpendicular of a Right-angled Triangle.**

*Rule.*—From the square of the hypotenuse subtract the square of the given side, and extract the square root of the remainder.

**EXAMPLES.**

1. The hypotenuse is 25 feet, the base 20 feet. What is the perpendicular?

$$25^2 = 625. \quad 20^2 = 400. \quad 625 - 400 = 225, \\ \sqrt{225} = 15. \quad \text{Ans. 15 feet.}$$

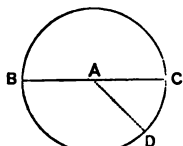
2. The hypotenuse is 40 feet, the base 30 feet. Required the perpendicular. *Ans. 26.45+ feet.*

3. A ladder 60 feet long is placed against the eaves of a barn, the foot of the ladder being 30 feet from the barn. Required the height of the barn. *Ans. 51.96+ feet.*



#### 451. THE CIRCLE.

A Circle is a plane figure bounded by a curved line, every point of which is equally distant from a point within, called the *centre*.



Circle.

The **Circumference** of a circle is the curved line which bounds the circle.

The **Diameter** of a circle is a right line which passes through the centre and terminates at both ends in the circumference, as B, C.

The **Radius** of a circle is a right line which extends from the centre to the circumference, as A, D.

452. To find the Circumference of a Circle when the Diameter is given.

*Rule.*—Multiply the diameter by 3.1416.

#### EXAMPLES.

1. What is the circumference of a circle whose diameter is 20 feet?

$$20 \times 3.1416 = 62.832 \quad \text{Ans. 62.832 feet.}$$

2. The diameter of a circle is 45 feet. What is the circumference? *Ans. 141.372 feet.*

3. A man owns a circular piece of land, the diameter of which is 84 feet. How many rods of fencing will be required to go round it? *Ans. 15.993+ rods.*

453. To find the Diameter of a Circle when the Circumference is given.

*Rule.*—Divide the circumference by 3.1416.

## EXAMPLES.

1. What is the diameter of a circle whose circumference is 30 feet?

$$30 \div 3.1416 = 9.549 + \quad \text{Ans. } 9.549 + \text{ feet.}$$

2. The circumference of a circle is 124 feet. What is the diameter?

$$\text{Ans. } 39.47 + \text{ feet.}$$

3. What is the diameter of a round log whose circumference is 275 inches?

$$\text{Ans. } 87.53 + \text{ inches.}$$

454. To find the Area of a Circle, the Diameter or Circumference being given.

*Rule.*—Multiply the square of the diameter by .7854. Or, Multiply the square of the circumference by .07958.

## EXAMPLES.

1. The diameter of a circle is 30 feet. What is the area?

$$30^2 = 900. \quad 900 \times .7854 = 706.86 \text{ square feet.}$$

2. The diameter of a circular plot of grass is 45 feet. How many square feet are in the plot?

$$\text{Ans. } 1590.435 \text{ sq. ft.}$$

3. The circumference of a circle is 60 feet. Required the area.

$$\text{Ans. } 286.488 \text{ sq. ft.}$$

4. The circumference of a circular fish-pond is 850 feet. Required the area.

$$\text{Ans. } 57496.55 \text{ sq. ft.}$$

455. To find the Diameter or Circumference of a Circle when the Area is given.

*Rule.*—Divide the area by .7854, and extract the square root of the quotient for the diameter. Or,

Divide the area by .07958, and extract the square root of the quotient for the circumference.

## EXAMPLES.

1. The area of a circle is 706.86 square feet. What is the diameter?

$$706.86 \div .7854 = 900. \quad \sqrt{900} = 30. \quad \text{Ans. } 30 \text{ feet.}$$

2. The area of a circle is 900 square feet. Required the diameter.

$$\text{Ans. } 33.85 + \text{ feet.}$$

3. If the area of a circular plot of grass is 1246 square feet, what is the circumference? *Ans.* 125.12+ ft.

456. To find the Side of a Square whose Area is equal to that of a given Circle.

*Rule.*—Multiply the diameter of the circle by .88627, or the circumference by .2821.

#### EXAMPLES.

1. The diameter of a circle is 60 feet. What is the side of a square of equal area? *Ans.* 53.1762 ft.

2. The circumference of a circular pond is 45 rods. What is the side of a square pond having the same area?

*Ans.* 12.6945 rods.

457. To find the Side of the largest Square that can be inscribed in a given Circle.

*Rule.*—Multiply the diameter by .707106, or multiply the circumference by .2251.

#### EXAMPLES.

1. What is the side of the largest square that can be inscribed within a circle whose diameter is 40 feet?

*Ans.* 28.284+ ft.

2. What will be the side of the largest square post that can be hewn from a log 20 inches in diameter?

*Ans.* 14.142+ inches.

3. What is the side of the largest square of glass that can be inserted in a circular niche 62 inches in circumference?

*Ans.* 13.9562 inches.



#### 458. SOLIDS.

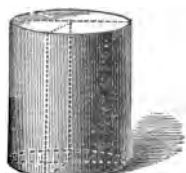
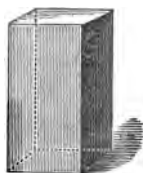
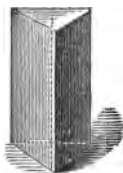
A Solid is that which has length, breadth, and thickness.

The Solidity or Volume of a solid is the space bounded by the surfaces of the solid.

A Prism is a solid whose ends are two equal parallel plane figures, and whose faces are parallelograms.



## 489. The Prism and the Cylinder.



Triangular Prism. Quadrangular Prism. Pentagonal Prism.

Cylinder.

According to the number of sides in their equal ends or bases, prisms are divided into *triangular*, *square*, *pentagonal*, etc.

A **Parallelopipedon** is a solid bounded by six plane parallelograms, every opposite two being equal and parallel.



Parallelopipedon.

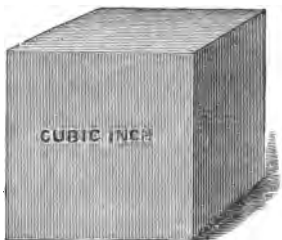
A **Cube** is a parallelopipedon having six equal square faces.

A **Cylinder** is a solid whose ends are two equal parallel circles, and whose surface is uniformly curved.

The **Altitude** of a prism or cylinder is the perpendicular distance between its two ends or bases.

A **Convex Surface** is the outer curved surface of a solid.

A **Concave Surface** is the inner curved surface of a hollow body.



A Cube.

## 460. To find the Surface of a Cube.

**Rule.**—Multiply the area of one of its sides by 6.

## EXAMPLES.

1. The area of one side of a cubic block of marble is 4 square feet. What is the entire surface?

*Ans.* 24 square feet.

2. The area of one side of a cube is 12 square feet. What is the entire surface?

*Ans.* 72 square feet.

**461. To find the Contents of a Cube.***Rule.*—*Multiply the length, breadth, and thickness together.***EXAMPLES.**

1. Required the contents of a cube measuring 3 feet on each side. *Ans.* 27 cubic feet.

2. Required the contents of a cube, the length of which is 8 feet, breadth 4 feet, and thickness 9 feet. *Ans.* 288 cu. ft.

**462. To find the Convex Surface of a Prism or Cylinder.***Rule.*—*Multiply the perimeter of the base by the altitude.*

To find the Entire Surface, *Add the area of the bases to the convex surface.*

**EXAMPLES.**

1. Find the convex surface of a prism whose altitude is 10 inches, and the sides of the base being 3, 4, and 5 inches. Find also the entire surface. *Ans.* 120 and 126 sq. inches.

2. Find the convex and whole surfaces of a cylinder, the circumference of whose base is 4 feet and altitude 12 feet? *Ans.* 48 and 50.54656 square feet.

3. How many square feet of canvas will be required to cover the convex surface of a cylinder  $2\frac{1}{2}$  feet in circumference and 12 feet long? *Ans.* 30 square feet.

**463. To find the Contents or Solidity of a Prism or a Cylinder.***Rule.*—*Multiply the area of the base by the altitude.***EXAMPLES.**

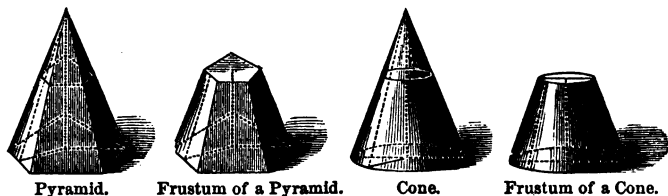
1. What are the contents of a cylinder which is 3 feet in diameter and 15 feet in length?

By Art. 454.  $3^2 \times .7854 = 7.0686$ , area of base.  
 $7.0686 \times 15 = 106.029$  *Ans.* 106.029 cub. feet.

2. How many cubic inches in a bushel measure which is a cylinder  $18\frac{1}{2}$  inches in diameter and 8 inches deep? *Ans.* 2150.42+ cub. inches.

3. How many gallons of 231 cubic inches are in a can 24 inches in diameter and 3 feet high? *Ans.* 70.5024 gallons.

## 464. The Pyramid and the Cone.



A **Pyramid** is a solid whose base is any plane figure, and whose faces are triangles which meet in a common point, called the *Vertex*.

A **Cone** is a solid whose base is a circle, and whose convex surface tapers uniformly to a point called the vertex.

The **Altitude** of a pyramid or a cone is the perpendicular distance from the base to the vertex.

The **Slant Height** of a *pyramid* is the distance from the middle of any side of the base to the vertex.

The **Slant Height** of a *cone* is the distance from any point of the circumference of the base to the vertex.

The **Frustum** of a pyramid or cone is the part which remains after cutting off the top by a plane parallel to the base.

**465. To find the Convex Surface of a Pyramid or Cone.**

*Rule.*—Multiply the perimeter of the base by the slant height, and divide the product by 2.

To find the **Entire Surface**, Add the area of the base to the convex surface.

## EXAMPLES.

1. What is the convex surface of a pyramid having 3 equal sides, each of which is 7 feet at the base, and the slant height of which is 12 feet?

$$7 + 7 + 7 = 21. \quad 21 \times 12 = 252. \quad 252 \div 2 = 126$$

*Ans.* 126 sq. feet.

2. What is the convex surface of a pyramid whose base is an equilateral triangle measuring 4 feet on each side, and whose slant height is 16 feet?

*Ans.* 96 sq. feet.

**466. To find the Solidity of a Pyramid or a Cone.**

*Rule.*—Multiply the area of the base by the altitude, and divide the product by 3.

**EXAMPLES.**

1. Find the solidity of a pyramid, the area of whose base is 90 feet and the altitude 48 feet. *Ans.* 1440 cubic feet.

2. What is the solidity of a cone, the area of whose base is 64 feet and altitude 58 feet? *Ans.*  $1237\frac{1}{3}$  cubic feet.

**467. To find the Convex Surface of a Frustum of a Pyramid or a Cone.**

*Rule.*—Multiply the sum of the perimeters or the circumferences of the two bases by the slant height, and divide the product by 2.

To find the Entire Surface, Add the areas of the bases to the convex surface.

**EXAMPLES.**

1. Find the convex surface and the entire surface of a frustum of a square pyramid whose slant height is 12 feet, the side of the lower base being 8 feet, and of the upper base 5 feet. *Ans.* 312 and 401 square feet.

2. Find the convex and whole surface of a frustum of a cone, the circumference of the lower base being 20 feet, of the upper 12 feet, and the slant height 10 feet.

*Ans.* 160 and  $203.2915+$  square feet.

**468. To find the Solid Contents of a Frustum of a Pyramid or Cone.**

*Rule.*—To the sum of the areas of both bases, add the square root of their product; multiply the sum by the altitude, and divide by 3.

**EXAMPLES.**

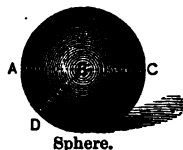
1. Required the solid contents of a frustum of a pyramid, the area of the lower base being 16 feet, of the upper base 9 feet, and the altitude 12 feet. *Ans.* 148 cubic feet.

2. Find the solid contents of a frustum of a cone, the area of the lower base being 90 feet, of the upper 40 feet, and the altitude 50 feet. *Ans.*  $3166\frac{2}{3}$  cubic feet.

## 469. THE SPHERE.

**A Sphere** is a solid bounded by a curved surface, every point of which is equally distant from a point within, called the *centre*.

The **Diameter** of a sphere is a right line which passes through the centre and terminates at both ends in the surface, as A, C.



The **Radius** of a sphere is a right line which extends from the centre to the surface, as B, D.

## 470. To find the Convex Surface of a Sphere.

*Rule.*—Multiply the circumference of the sphere by its diameter.

## EXAMPLES.

1. The circumference of a sphere is 62.832 square inches, the diameter 20 inches. Required the convex surface.

*Ans.* 1256.64 square inches.

2. Required the surface of a sphere whose diameter is 42 inches.

*Ans.* 5541.7824 square inches.

3. What will it cost to gild a ball 12 inches in diameter, at 10 cents per square inch?

*Ans.* \$45.239+.

## 471. To find the Solid Contents of a Sphere.

*Rule.*—Multiply the convex surface by the radius, and divide the product by 3.

## EXAMPLES.

1. The convex surface of a sphere is 1272 square inches, the radius 10 inches. Required the solid contents.

*Ans.* 4240 cubic inches.

2. The convex surface of a sphere is 1728 square inches, the radius 14 inches. Required the solid contents.

*Ans.* 8064 cubic inches.



## LUMBER MEASURE.

**472.** A standard board of hard wood, such as oak, walnut, is one that is 12 feet long, 1 foot wide, and 1 inch thick, and therefore contains 12 square feet 1 inch thick. A standard board of pine is 16 feet long. In timber for exportation,  $\frac{1}{4}$  inch more is allowed for shrinkage, planing, etc. The length of boards, joists, beams, etc., is measured in even inches, odd inches not being counted.

**473. To measure boards.**

*Rule I.*—Multiply the length in feet by the width in inches, and divide the product by 12; the quotient will be the number of square feet. When the board is more or less than 1 inch thick, add or subtract in proportion.

*Rule II.*—Multiply the length in inches by the width in inches, and divide the product by 144. The product will be the number of square feet.

**Note 1.**—A plank 2 inches thick, 12 feet long, and 1 foot wide, will measure 24 feet, board measure.

**Note 2.**—If the boards are tapering, take half the sum of the two ends for the mean width. Some inspectors measure only the narrow end.

## EXAMPLES.

1. How many square feet in a board 16 feet long, 15 inches wide, and 1 inch thick?

$$16 \times 15 = 240. \quad 240 \div 12 = 20. \quad \text{Ans. 20 sq. feet.}$$

2. How many square feet in a board 10 feet long, 24 inches wide, and  $1\frac{1}{2}$  inches thick? Ans. 30 sq. feet.

3. How many square feet in a board 54 inches long, 16 inches wide, and  $1\frac{1}{4}$  inches thick? Ans.  $7\frac{1}{2}$  sq. feet.

4. Required the contents of a board 15 feet long, 9 inches wide at one end and 13 inches at the other.

5. Find the contents of 2 boards both 14 feet long, one of which is 18 inches wide and the other  $12\frac{1}{2}$  wide.

474. To measure joists, beams, etc.

*Rule.*—Multiply the width in inches by the thickness, and this product by the length in feet; divide by 12, and the quotient will be the contents in board feet.

EXAMPLE.

1. What are the contents, board measure, of a stick of timber 16 feet long, 3 inches by 4 on the sides?

$$3 \times 4 = 12. \quad 12 \times 16 = 192. \quad 192 \div 12 = 16, \text{ Ans.}$$

475. To find the number of feet which a given log will contain when sawn square.

*Rule I.*—Square half the diameter of the smaller end in inches, and multiply by the length of the log in feet.

Practically, it is customary to take  $\frac{3}{4}$  or  $\frac{7}{8}$  of the diameter of the small end of the log, for the side of the square which can be sawn from a given log. See Art. 457.

*Doyle's Rule.*—For logs 16 feet in length, Subtract 4 from the diameter in inches. The square of the remainder will be the number of square feet.

EXAMPLE.

1. How many square feet can be cut from a log 20 feet long and 18 inches in diameter?

BY RULE I.

$$\frac{2}{3} \text{ of } 18 = 12. \quad \frac{1}{2} \text{ of } 12 = 6. \quad 6 \times 6 = 36.$$

$$36 \times 20 = 720. \quad \text{Ans. } 720 \text{ sq. feet.}$$

476. To find the number of boards which can be cut from a given thickness of log.

*Rule.*—Divide the thickness of the log, minus  $\frac{1}{4}$  inch, by 1 plus the saw-cut ( $\frac{1}{4}$  inch).

*Note.*—To find the number of square feet of plank or fencing, that is tongued and grooved, required for a given space, allowance must be made for the tongue, as that does not appear. For instance, a floor  $11\frac{1}{2}$  feet wide will require 12 planks 12 inches wide, as each plank will lose the  $\frac{1}{4}$  inch when they are put together.

## SPECIFIC GRAVITY.

**477.** The Specific Gravity of any substance is its weight compared with that of an equal bulk of fresh water.

A cubic foot of rain-water, at a temperature of 60° Fahrenheit, weighs 62½ lbs., or 1000 ounces avoirdupois. One cubic inch weighs  $\frac{1000}{1728}$  ounces.

The specific gravity of a body may be found by dividing its weight by the weight of an equal quantity of fresh water. Bodies heavier than water, when immersed, lose the weight of an equal bulk of water. Floating bodies lose weight in proportion to the quantity of fluid they displace.

## VELOCITY OF SOUND.

**478.** Sound travels 1142 feet, or  $\frac{3}{4}$  of a mile, per second, or a mile in about  $4\frac{3}{4}$  seconds. Sound of all kind travels at the same rate, the whisper as fast as the cannon's roar. Sound passes in water at the rate of 4708 feet per second.

### EXAMPLES.

1. A flash of lightning was observed 5 seconds before the thunder was heard. What was the distance of the cloud?

$$\frac{3}{14} \times 5 = \frac{15}{14} = 1\frac{1}{14}. \quad \text{Ans. } 1\frac{1}{14} \text{ miles.}$$

2. The report of a minute-gun at sea was heard 4 seconds after the flash was seen. How far distant was the gun?

## LIGHT.

**479.** Light travels from the sun to the earth, 95,000,000 miles, in  $8\frac{1}{3}$  minutes. The intensity of light at any distance from a luminous body is in an inverse proportion to the square of the distance. Thus, at a certain point, a board 1 foot square will cast a shadow 2 feet square at double the distance, 3 feet square at 3 times the distance, 4 feet square at 4 times the distance. The areas being increased as the squares of the distances, the light consequently is decreased in the same proportion.



Light from gas, as usually obtained, is not in proportion to the gas consumed. It is more economical to have one good large gaslight than several small ones. A burner consuming two feet per hour gives the light of two and a quarter candles only, while a burner consuming  $7\frac{1}{2}$  feet per hour gives the light of twenty-two candles, the pressure being uniformly  $\frac{1}{16}$  of an inch.

A clear glass globe obstructs about 12 per cent. of the light ; a clear globe engraved with flowers, about 24 per cent. ; a globe ground all over with flowers, about 40 per cent. ; an opal globe with flowers, about 60 per cent.

## HEAT AND COLD.

**480.** Heat expands all bodies, with few exceptions, but in different degrees. It expands liquids more than solids, and gases more than liquids. The thermometer, by its scale of equal divisions marked upon the tube, indicates the degree of heat in a given case. The mercury in the thermometer expands as heat is applied, and the scale enables us to determine the amount. The temperature of melting ice is called the freezing-point, and is marked  $32^{\circ}$ . The temperature of boiling water is marked  $212^{\circ}$ . When the temperature is  $68^{\circ}$ , it is called summer heat ;  $98^{\circ}$  is called blood heat ;  $108^{\circ}$ , fever heat. This is the scale commonly used in this country, England, and Holland, and it is known by the name of the inventor, Fahrenheit. Above the boiling-point, heat is measured by an instrument called a pyrometer. For very low temperatures, spirit-of-wine thermometers are employed.

## GAUGING.

**481.** Gauging is the process of finding the contents or capacity of casks and other vessels.

**Ullage** is the difference between the actual contents of a vessel and its capacity, or that part which is empty.

The usual manner of gauging is by the diagonal rod, which gives only approximate results, but sufficiently accurate for ordinary purposes.

**482. For small cylindrical vessels.**

*Rule.*—Multiply the square of the diameter, in inches, by 34, and that by the height, in inches, and point off four figures; the result will be the capacity, in wine gallons and decimals of a gallon.

If beer gallons are required, multiply by 28 instead of 34.

**EXAMPLE.**

A can measures 15 inches in diameter, and is 2 feet 2 inches in height. How many gallons will it contain?

$$15 \times 15 = 225 \times 26 \text{ inches (height)} = 5850$$

$$5850 \times 34 = 198900. \quad \text{Ans. } 19\frac{89}{100} \text{ gals.}$$

**483. For casks.**

*Rule.*—Add  $\frac{7}{10}$  of the difference between the head diameter and the bung diameter to the head diameter, for the mean diameter; then proceed as in the previous rule. Or,

Add together the square of the bung and head diameters, and of twice the middle diameter between the bung and head. Multiply the sum by length of cask, and the product by .1309.

**484. To find the contents of ullage casks.**

*Rule.*—When the cask is standing—

Find one-third the sum of the head, mean, and bung diameters, and square the result; multiply by the height of the fluid in inches, and that product by .0034 for wine gallons, and by .0028 for beer gallons.

**485. To test the accuracy of Dry Measures which are in the form of a cylinder.**

*Rule.*—Divide 2738 by the square of the diameter, in inches; the quotient will be the depth for a bushel; one-half the quotient will be the depth for a half-bushel; one-quarter of the quotient for a peck, etc.

**486. To test the accuracy of measures for Fluids which are in the form of a cylinder.**

*Rule.*—Square the diameter, in inches, for a divisor.

Divide 294 for wine gallons; 359 for beer gallons; 342 for dry gallons.

## GRAIN MEASURE.

487. To find the quantity of grain in a bin or wagon.

*Rule.*—Multiply the height, length, and breadth together, in inches, and divide by 2150.42; the quotient will be the number of bushels.

488. To find the quantity of grain when heaped on the floor in the form of a cone.

*Rule.*—Square the depth and square the slant height, in inches; take their difference and multiply by the depth, and this product by .0005; the result will be the contents, in bushels.

489. To find the quantity of grain when heaped against a straight wall.

*Rule.*—Square one-half the depth, and proceed as in the previous rule.

Weight of Grain per Bushel, as Estimated among Shipping Merchants.

|                      |         |                |         |
|----------------------|---------|----------------|---------|
| Wheat . . . . .      | 60 lbs. | Oats . . . . . | 35 lbs. |
| Rye . . . . .        | 56 "    | Corn . . . . . | 56 "    |
| Barley . . . . .     | 48 "    | Beans. . . . . | 60 "    |
| Clover seed. . . . . | 60 "    | Peas . . . . . | 60 "    |

## CALCULATIONS IN NATURAL SCIENCE.

### MECHANICAL POWERS.

490. Power, or Force, is a compound of weight and velocity. Machinery is employed to save either *time* or *force*; but no machine can save both: either force is gained at the expense of time, or time is gained at the expense of force.

Motion takes place only when the power is greater than the weight or resistance, including friction.

It is a principle in mechanics, that the power is to the weight as the velocity of the weight is to the velocity of the power.

The mechanical powers, of which all machines, however complicated, are constructed, are three in number, viz., LEVER, INCLINED PLANE, and PULLEY. The Wheel and

Axle is a *revolving* lever ; the Wedge is a *double* inclined plane ; and the Screw is a *revolving* inclined plane.

**491. The Lever.**—There are three kinds of levers :

1. When the fulcrum is between the weight and the power.
2. When the weight is between the power and the fulcrum.
3. When the power is between the fulcrum and the weight.

The weight multiplied by its distance from the fulcrum is equal to the power multiplied by its distance from the fulcrum.

**EXAMPLE.**—The weight on the short arm of a lever is 120 lbs., at a distance of 1 foot from the fulcrum : what power applied to the long arm, at a distance of 8 feet, will balance it ?

$$120 \times 1 = 120. \quad 120 \div 8 = 15. \quad \text{Ans. 15 lbs.}$$

When the fulcrum or support is between the weight and power, the pressure upon the fulcrum equals the sum of the weight and power.

When the fulcrum is at one extremity and the power or weight at the other, the pressure upon the fulcrum equals the difference between the weight and the power.

**492. The Wheel and Axle, or Revolving Lever.**—The power multiplied by the radius (half the diameter) of the wheel is equal to the weight multiplied by the radius of the axle.

**EXAMPLE.**—The diameter of a wheel is 80 inches, and that of the axle 6 inches : what power on the wheel will balance 600 pounds on the axle ?

*Radius of wheel, 40 inches ; radius of axle, 3 inches.*

$$600 \times 3 = 1800. \quad 1800 \div 40 = 45. \quad \text{Ans. 45 lbs.}$$

**493. Pulleys.**—Pulleys are of two kinds, fixed and movable pulleys. Fixed pulleys do not increase the power, but they are useful for applying it in the most convenient direction.

In the movable pulley all the parts of a cord are equally stretched, and therefore each cord from one pulley to another will bear an equal part. Hence the power is doubled for every movable pulley.

**EXAMPLE.**—What power is required to balance a weight of 1800 lbs., by means of 3 movable pulleys?

$$3 \times 2 = 6. \quad 1800 \div 6 = 300. \quad \text{Ans. 300 lbs.}$$

**494. The Inclined Plane.**—The power required to raise a body up an inclined plane, is equal to the product of the height and weight divided by the length of the plane.

**495. The Wedge, or Double Inclined Plane,** derives its advantages from the fact that power can be applied to it by percussion or a stroke. As a theoretical rule, it may be said that when two movable bodies are forced apart, the power required is equal to the product of the resisting power multiplied by  $\frac{1}{2}$  the thickness of the back, divided by the length of one of the inclined sides.

When only one of the bodies is movable, the power required is equal to the product of the resisting power multiplied by the thickness of the back, divided by the length of the wedge.

**496. The Screw, or Revolving Inclined Plane,** is an inclined plane wound round a cylinder, and its length is found by adding the square of the circumference of the screw to the square of the distance between the threads, and extracting the square root of the sum. The height of the plane is the distance between any two contiguous threads; the base of the plane is the circumference of the screw. Having the length of the plane and its height, the power required is found as for the inclined plane.

If the power is applied at the end of a lever, the circumference of the thread may be taken as extending to the circle formed by the end of the lever.

**EXAMPLE.**—If the distance of the centres of two threads be  $\frac{1}{2}$  of an inch, and the radius of the lever attached to the screw be 12 inches, what is the power of the screw?

The circumference of the screw will be

$$12 \times 2 \times 3.14156 = 75\frac{1}{2} \text{ in., nearly.}$$

Therefore, to find the power of the screw,

$$75\frac{1}{2} \div \frac{1}{4} = 300\frac{1}{8}, \text{ the power of the screw.}$$

**497.** The power of a man, it is estimated, on an average, is able to raise 70 lbs. 1 foot high in a second for 10 hours per day.

**498. Horse-Power**, in machinery, is estimated at 33,000 lbs. raised 1 foot every minute. A machine horse-power is considered equal to 4.4 horses. The strength of one horse is equivalent to that of 5 men. A draft horse can draw 1600 lbs. 23 miles per day, weight of carriage included.

**499. Steam**, under ordinary circumstances, is equal to the pressure of the atmosphere, or about 15 lbs. on the square inch. A cubic inch of water is converted into about 1 cubic foot of steam, producing a force equal to 2200 lbs. 1 foot high. Its weight is .488 that of the air; or 27.206 cubic feet of steam equal 1 lb. avoirdupois.

One cubic foot of boiler will heat 2000 feet of space to an average heat of about 70° or 80° Fahr.; and one square foot of steam-pipe is adequate to the warming of 200 cubic feet of space.

The effects of heat may be seen in the iron rails on the railroads throughout the country. There is a variation of 80° in the temperature between the cold of winter and the heat of summer. This is sufficient to elongate a bar of iron 10 inches long,  $\frac{1}{1000}$  of an inch, or  $\frac{1}{2000}$  part, which would require, to produce the same effect, a force of fifty tons upon the square inch. The tubes of Menai Bridge vary in length with the changes of the air, from half an inch to three inches every twenty-four hours. Iron bars, when much heated, frequently injure masonry, instead of supporting it, from the same cause.

Mercury expands between 32° and 212° from 1,000,000 to 1,018,155, and boils at 662°. Ether boils at 95°. Vinous fermentation begins at 60° to 77°; acetous fermentation begins at 78°.

Most metals occupy less space when solid than when melted, and therefore produce imperfect casts. For this reason coins, medals, and ornamental wares are stamped instead of cast, to secure the requisite size, sharpness, and beauty. Lead pipes which convey steam or hot water become permanently elongated, and leaden linings, when hot water is used, gather into permanent ridges.

Alcohol expands  $\frac{1}{2}$  between 32° and 212°, and, under ordinary changes of atmosphere, would increase from 20 gallons in January to 21 gallons in July. It boils at 173°.

Water converted into steam occupies about 1700 times as much space as before. In freezing it expands  $\frac{1}{9}$  of its bulk, and  $\frac{1}{88}$  for every degree from  $40^{\circ}$  to  $212^{\circ}$ : hence ice floats on the surface of water, and close vessels are burst when the water they contain is frozen.

### THE STRENGTH OF MATERIALS.

500. The strength of a beam increases as the square of one of its homologous sides, while the weight of the beam increases as the cube; and therefore long beams are weak from their own weight.

A beam twice as broad as another is *twice* as strong, one twice as deep is *four* times as strong, and one twice as long has only *half* the strength.

A triangular beam is twice as strong when resting on its broad base as when resting on its edge.

If the beam is supported in the middle and loaded at each end, it will bear the same weight; that is, each end will bear half the weight.

A beam fixed at both ends and loaded in the middle will bear one-half more weight than it will when the ends are loose.

When the weight is distributed uniformly over the whole length of the beam, it will bear double what it will when the entire weight is in the middle. A beam fixed at one end and loaded at the end projecting, will bear only one-fourth the weight it will when loaded in the middle and supported at the ends.

From various experiments, it appears that the ultimate strength of various bodies, an inch square and an inch round bar of each, 1 foot long, loaded in the middle and lying loose at both ends, is as follows:

|          | Square bar. | Round bar. |                | Square bar. | Round bar. |
|----------|-------------|------------|----------------|-------------|------------|
| Oak..... | 800 lbs.    | 628 lbs.   | Pitch Pine.... | 916 lbs.    | 719 lbs.   |
| Ash..... | 1137 "      | 893 "      | Cast Iron..... | 2580 "      | 2026 "     |
| Elm..... | 569 "       | 447 "      | Wrought Iron   | 4013 "      | 3152 "     |

One-third of the above weights is considered sufficient in most cases for a permanent load.

## A Cubic Foot of

|                            | Pounds.           |                             | Pounds            |
|----------------------------|-------------------|-----------------------------|-------------------|
| Loose earth or sand weighs | 95                | Clay and stones weigh       | 160               |
| Common soil                | 124               | Cork weighs                 | 15                |
| Strong "                   | 127               | Tallow "                    | 59                |
| Clay                       | 135               | Bricks "                    | 125               |
| Lead                       | 708 $\frac{3}{4}$ | Marble "                    | 171               |
| Brass                      | 534 $\frac{3}{4}$ | Granite "                   | 165               |
| Copper                     | 555               | Sea-water weighs            | 64 $\frac{1}{10}$ |
| Wrought iron               | 486 $\frac{3}{4}$ | Oak wood "                  | 55                |
| Anthracite coal            | 50 to 55          | Red pine "                  | 42                |
| Bituminous "               | 45 to 55          | White pine "                | 30                |
| Charcoal (hard wood) "     | 18 $\frac{1}{2}$  | Charcoal (pine wood) weighs | 18                |

## Gross Weights of Sundry Articles

As usually taken when not actually weighed.

|             |                   |                   |                   |
|-------------|-------------------|-------------------|-------------------|
| Ale.....    | 320 lbs. per bbl. | Oil .....         | 400 lbs. per bbl. |
| Apples..... | 56 " " bush.      | Onions.....       | 57 " " bush.      |
| Beef .....  | 320 " " bbl.      | Pork .....        | 320 " " bbl.      |
| Cider ..... | 350 " " "         | Potatoes.....     | 150 " " "         |
| Eggs.....   | 200 " " "         | Salt, coarse .... | 350 " " "         |
| Fish .....  | 300 " " "         | Syracuse... ..    | 280 " " "         |
| Lime.....   | 200 " " "         | in sacks ....     | 200 " " "         |
| Nails.....  | 108 " " keg.      | Turnips .....     | 56 " " bush.      |

## MISCELLANEOUS RULES.

**501. To find two numbers when their sum and difference are given.**

*Rule.*—Add one-half their sum to one-half their difference, for the larger number, and take one-half their difference from one-half their sum, for the smaller.

**502. To find two numbers when their sum and product are given.**

*Rule.*—Take the square root of the difference between the square of the sum and four times their product; the result will be the difference between the numbers.



**503.** To find two numbers when their difference and product are given.

*Rule.*—To the square of their difference add four times the product, and the square root of the sum will be the sum of the numbers.

**504.** To find two numbers when their sum and quotient are given.

*Rule.*—Divide the sum by the quotient increased by 1; the result will be the smaller number.

**505.** To find two numbers when their difference and quotient are given.

*Rule.*—Divide the difference by the quotient less 1, for the smaller number.

**506.** To find two numbers when their sum and the sum of their squares are given.

*Rule.*—From the square of their sum take the sum of their squares, and half the remainder will be the product; then proceed by rule above.

**507.** To find two numbers when their sum and the difference of their squares are given.

*Rule.*—Divide the difference of their squares by their sum; the quotient will be their difference.

**508.** To find two numbers when their product and quotient are given.

*Rule.*—Divide the product by the quotient, and the square root of the result will be the smaller number.

**509.** To find two numbers when the square of their sum and the sum of their squares are given.

*Rule.*—From the square of the sum take the sum of the squares; the remainder will be twice the product of the numbers. Subtract four times the product from the square of the sum, and the remainder will be the square of their difference. Extract the roots, and proceed as in rule above.

## INDUSTRIES OF NATIONS, 1870 AND 1880, IN MILLIONS.

|                        | Commerces. |          | Manufactures. |          | Mining. |        | Agriculture. |          | Carrying Trade, etc. |        | Banking. |        | Total.   |          | Increase. |
|------------------------|------------|----------|---------------|----------|---------|--------|--------------|----------|----------------------|--------|----------|--------|----------|----------|-----------|
|                        | 1870.      | 1880.    | 1870.         | 1880.    | 1870.   | 1880.  | 1870.        | 1880.    | 1870.                | 1880.  | 1870.    | 1880.  | 1870.    | 1880.    |           |
| United States.....     | \$860      | \$1,505  | \$3,410       | \$4,440  | \$190   | \$360  | \$2,075      | \$2,625  | \$660                | \$830  | \$200    | \$260  | \$7,395  | \$10,020 | \$2625    |
| Canada.....            | 165        | 175      | 185           | 230      | 0       | 0      | 255          | 300      | 25                   | 45     | 10       | 20     | 630      | 770      | 140       |
| Great Britain.....     | 2735       | 3,460    | 3,210         | 3,790    | 230     | 325    | 1,300        | 1,200    | 560                  | 805    | 400      | 540    | 8,435    | 10,120   | 1685      |
| France.....            | 1245       | 1,660    | 2,195         | 2,425    | 45      | 60     | 2,060        | 2,000    | 210                  | 310    | 150      | 170    | 5,905    | 6,625    | 720       |
| Germany.....           | 1350       | 1,920    | 1,705         | 2,135    | 70      | 105    | 1,550        | 1,700    | 210                  | 345    | 125      | 140    | 5,010    | 6,345    | 1335      |
| Russia.....            | 550        | 955      | 1,025         | 1,145    | 40      | 55     | 1,750        | 1,850    | 140                  | 220    | 60       | 75     | 3,565    | 4,300    | 735       |
| Austria.....           | 415        | 700      | 915           | 1,030    | 25      | 35     | 1,200        | 1,315    | 80                   | 120    | 70       | 85     | 2,705    | 3,285    | 580       |
| Italy.....             | 370        | 480      | 515           | 775      | 10      | 10     | 650          | 725      | 55                   | 75     | 25       | 30     | 1,625    | 1,895    | 270       |
| Spain.....             | 155        | 190      | 385           | 440      | 25      | 35     | 475          | 545      | 35                   | 60     | 10       | 15     | 1,085    | 1,285    | 200       |
| Belgium.....           | 320        | 515      | 365           | 425      | 30      | 40     | 170          | 175      | 35                   | 40     | 15       | 15     | 935      | 1,210    | 275       |
| Holland.....           | 355        | 550      | 185           | 210      | 0       | 0      | 205          | 230      | 20                   | 25     | 65       | 70     | 830      | 1,085    | 255       |
| Sweden and Norway..... | 135        | 180      | 180           | 200      | 10      | 10     | 235          | 260      | 45                   | 75     | 15       | 15     | 620      | 740      | 120       |
| Denmark.....           | 75         | 95       | 70            | 90       | 0       | 0      | 125          | 135      | 5                    | 10     | 5        | 5      | 280      | 335      | 55        |
| Portugal.....          | 50         | 65       | 50            | 55       | 0       | 0      | 115          | 125      | 0                    | 5      | 5        | 5      | 220      | 255      | 35        |
| Turkey, etc.....       | 415        | 315      | 400           | 340      | 0       | 0      | 265          | 235      | 15                   | 30     | 15       | 15     | 1,110    | 935      | 0         |
| Australia.....         | 285        | 445      | 45            | 65       | 45      | 30     | 175          | 260      | 5                    | 15     | 25       | 50     | 580      | 865      | 285       |
| South Africa.....      | 40         | 85       | 10            | 15       | 10      | 20     | 25           | 35       | 0                    | 0      | 0        | 0      | 85       | 155      | 70        |
| South America.....     | 425        | 450      | 90            | 110      | 35      | 40     | 350          | 400      | 15                   | 30     | 20       | 25     | 935      | 1,055    | 120       |
| Totals.....            | \$9945     | \$13,745 | \$14,930      | \$17,720 | \$765   | \$1125 | \$12,980     | \$14,115 | \$2115               | \$3040 | \$1215   | \$1535 | \$41,950 | \$51,280 | \$9505    |

# BUSINESS FORMS

AND

# INFORMATION.

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1

# BUSINESS MAXIMS.



**ENDEAVOR** to be perfect in the calling in which you are engaged.

**Think** nothing insignificant which has a bearing upon your success.

**There is more in the use of advantages than in the measure of them.**

**Make** no investments without a full acquaintance with their nature and condition; and select such investments as have intrinsic value.

**Of two investments, choose that which will best promote your regular business.**

**Become known,—and favorably known.**

**Never refuse a choice when you can get it.**

**Goods well bought are half sold.**

**Goods in store are better than bad debts.**

**Ready money is a ready friend.**

**Nothing valuable is lost by civility.**

**By prosecuting a useful business energetically, humanity is benefited.**

**Keep accurate accounts, and know the exact condition of your affairs.**

**Be economical: a gain usually requires expense; what is saved is clear.**

**Interest and small expenses are commercial moths.**

**Reality makes no allowances for wishes or bad plans.**

## PAYMENTS AND LEGAL TENDER.

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The law gives the debtor who owes several debts to the same creditor, the right to apply a voluntary payment, *at the time of making it*, to whichever debt he prefers. If the debtor does not exercise the right, it passes to the creditor; and if neither party makes an application of it, the court will apply the payment according to its own view of the intrinsic justice and equity of the case.

Payment of debts cannot be enforced after the lapse of a certain number of years, which is specified in the several States in what are called the statutes of limitations.

In some States, to renew the obligation and take the case out of the operation of the statute of limitations, it is necessary that a promise to pay, or acknowledgment of the debt, be made in writing; in others, a payment made, or an acknowledgment and promise to pay to the creditor, in the presence of witnesses, is sufficient.

The tender of payment of a debt, duly made, operates in bar of any claim for damages and interest, and also in bar of the costs of an action brought to recover the debt. A creditor who refuses a tender, sufficient in amount and duly made, cannot afterwards, for the purpose of oppression or extortion, avail himself of his refusal. The debtor, however, remains liable to pay whenever called upon.

A man to whom payment is made is not bound, under ordinary circumstances, to give a receipt or to make change.

A payment made to the proper person, in "**lawful money of the United States**," is indisputably good.

By an act of Congress, the payment of debts *with coin* is regulated as follows:

**All gold coins and the silver dollar, at their respective values, for any amount.**

**The half-dollar, quarter-dollar, dime, and half-dime, at their respective values, for debts under five dollars.**

**Three-cent pieces**, for debts of any amount *under thirty cents*.

**One-cent pieces**, for debts of any amount *under ten cents*.

The Treasury notes, called "**greenbacks**," are also a legal tender.

Bank notes are a good tender, *unless expressly objected to*, if the bank is in good credit.

A payment made in *counterfeit coin or notes* is no payment, if the receiver gives notice to the payer within a reasonable time that the coin or notes are counterfeit.

The taking of a promissory note for a pre-existing debt, or a contemporaneous consideration, is treated *prima facie* as a conditional payment only; that is, as payment only if it is duly paid at maturity.

When the creditor voluntarily, having free choice, and not from necessity, accepts the promissory note or bill of a *third person* for a pre-existing debt, the debt is extinguished, though the security may prove to be worthless.

When money is *remitted by mail* to the creditor, the debt is discharged if the debtor can show that the letter containing the money was properly mailed, and that it was done in accordance with the express direction of the creditor, or a custom from which such authority might be implied. If this can be shown, and a loss occurs, it is the loss of the creditor; if otherwise, it is the loss of the debtor.

The receiver of a check, if he receives it in the town or city where it is payable, should present it for payment to the bank or bankers, at the *farthest, on the next succeeding day after it is received*. If payment is not thus demanded, and the bank or bankers should fail before the check is presented, the loss will be the loss of the holder.

A creditor is not bound to accept a check remitted to him, and he may commence a suit for debt even while the check remains in his hands.

Money paid voluntarily in a transaction, with full knowledge of the facts, cannot be recovered.

Interest is not due on a note except from maturity, unless it is so mentioned in the note.

One claim may be set off against another, when it exists at the commencement of a suit and in the claimant's own right.

When part of a claim is admitted, the debtor should tender the amount admitted; this will relieve him from costs, if the disputed portion is decided in his favor.

Statute Limitations of the United States.

| NAMES OF STATES<br>AND<br>TERRITORIES. | Open Accounts. | Notes and Contracts<br>in Writing. |      | Sealed Instruments. | Judgments. | NAMES OF STATES<br>AND<br>TERRITORIES. | Open Accounts. | Notes and Contracts<br>in Writing. |      | Sealed Instruments. | Judgments. |
|--|----------------|------------------------------------|------|---------------------|------------|--|----------------|------------------------------------|------|---------------------|------------|
|  | Yrs.           | Yrs.                               | Yrs. | Yrs.                | Yrs.       |  | Yrs.           | Yrs.                               | Yrs. | Yrs.                | Yrs.       |
| Alabama . . .                          | 3              | 6                                  | 10   | 20                  |            | Missouri . . .                         | 5              | 10                                 | 10   | 20                  |            |
| Arkansas . . .                         | 3              | 5                                  | 5    | 10                  |            | Montana . . .                          | 5              | 10                                 | 10   | 10                  |            |
| Arizona . . .                          | 2              | 4                                  | 4    | 5                   |            | Nebraska . . .                         | 4              | 5                                  | 5    | 5                   |            |
| California . . .                       | 2              | 4                                  | 4    | 5                   |            | Nevada . . .                           | 2              | 6                                  | 4    | 5                   |            |
| Colorado . . .                         | 6              | 6                                  | 6    | 3                   |            | New Hampshire                          | 6              | 6                                  | 20   | 20                  |            |
| Connecticut . . .                      | 6              | 6                                  | 17   | 17                  |            | New Jersey . .                         | 6              | 6                                  | 16   | 20                  |            |
| Dakota . . .                           | 6              | 6                                  | 20   | 20                  |            | New Mexico . .                         | 4              | 6                                  | 6    | 15                  |            |
| Delaware . . .                         | 3              | 6                                  | 20   | 20                  |            | New York . . .                         | 6              | 6                                  | 20   | 20                  |            |
| Dist. of Columbia,                     | 3              | 3                                  | 12   | 12                  |            | North Carolina                         | 3              | 3                                  | 10   | 10                  |            |
| Florida . . .                          | 4              | 5                                  | 20   | 20                  |            | Ohio . . . . .                         | 6              | 15                                 | 15   | 15                  |            |
| Georgia . . .                          | 4              | 6                                  | 20   | ...                 |            | Oregon . . . .                         | 6              | 6                                  | 10   | 10                  |            |
| Idaho . . . . .                        | 2              | 4                                  | 4    | 5                   |            | Pennsylvania . .                       | 6              | 6                                  | 20   | 20                  |            |
| Illinois . . . .                       | 5              | 10                                 | 10   | 20                  |            | Rhode Island . .                       | 6              | 6                                  | 20   | 20                  |            |
| Indiana . . . .                        | 5              | 20                                 | 20   | 20                  |            | South Carolina                         | 6              | 6                                  | 20   | 20                  |            |
| Iowa . . . . .                         | 5              | 10                                 | 10   | 20                  |            | Tennessee . . .                        | 6              | 6                                  | 10   | 10                  |            |
| Kansas . . . .                         | 3              | 5                                  | 5    | 15                  |            | Texas . . . . .                        | 2              | 4                                  | 4    | 10                  |            |
| Kentucky (store                        |                |                                    |      |                     |            | Utah . . . . .                         | 2              | 4                                  | 4    | 5                   |            |
| acct. 2 yrs.) . .                      | 5              | 15                                 | 15   | 15                  |            | Vermont . . . .                        | 6              | 6                                  | 8    | 8                   |            |
| Louisiana . . .                        | 3              | 5                                  | 10   | 10                  |            | Virginia (store                        |                |                                    |      |                     |            |
| Maine . . . . .                        | 6              | 6                                  | 20   | 20                  |            | acct. 2 yrs.) . .                      | 5              | 5                                  | 20   | 20                  |            |
| Maryland . . .                         | 3              | 3                                  | 12   | 12                  |            | Washington . . .                       | 5              | 6                                  | 6    | 6                   |            |
| Massachusetts .                        | 6              | 6                                  | 20   | 20                  |            | West Virginia                          |                |                                    |      |                     |            |
| Michigan . . . .                       | 6              | 6                                  | 10   | 10                  |            | (store ac. 3 yrs.)                     | 5              | 10                                 | 10   | 10                  |            |
| Minnesota . . .                        | 6              | 6                                  | 10   | 10                  |            | Wisconsin . . .                        | 6              | 6                                  | 20   | 20                  |            |
| Mississippi . . .                      | 3              | 6                                  | 7    | 7                   |            | Wyoming . . . .                        | 4              | 5                                  | 5    | ...                 |            |

In some States, judgments become dormant different from the time given in the table, but may be renewed, and in some, causes of action arising in another State are affected by the laws of that State. A statute of limitation commences to run from the time when legal proceedings may be brought for the amount due. Accounts in general, from the date of the last item.

## RECEIPTS.

**A Receipt** is an acknowledgment in writing that a sum of money, or other consideration of value, has been received. A receipt is evidence of a payment against the person who signs it, and is a voucher used by agents to prove the correctness of their accounts. It is also evidence in proving facts quite distinct from the payment stated in it.

A Simple Receipt is merely written evidence: it does not exclude verbal evidence of payment; and upon satisfactory proof that it was obtained by fraud, or given under error or a mistake as to facts, it may be inquired into and corrected at law or equity.

It is advisable, when payments of importance are made, or disputes are apprehended, to take receipts. They should be kept where they are easy of access, and in a place of safety. When not in a receipt-book, they should be appropriately folded, labelled, and filed.

One of the advantages of the statutes of limitations is, that debtors are not obliged to take care forever of documents or vouchers which prove that a demand has been satisfied, and a limit is fixed beyond which there is no necessity for producing them.

A man is not bound by law to give a receipt; although, by universal custom and courtesy of business, receipts are generally given when desired. When refused, the facts may be proved by witnesses.

A full and complete receipt states—

That a payment has been received.

The date of the payment.

The amount or article received.

From whom; and if for another, on whose behalf payment is made.

To what debt or purpose it is to be applied.

By whom received; and if for another, on whose behalf it was received.

When the receipt is signed by the very person to whom the



payment is ultimately to go, his signature is sufficient. Where the receipt is made out and signed by an agent, he may either write the receipt as if the principal himself were to sign it, then write his principal's name underneath, and his own name below his principal's, using the prefix "per" or "by," to signify the agency, in the following manner:

*Received, etc.*

*Edward M. Sawyer,*

*per John T. Warren.*

Or, he may draw up the receipt for himself, and sign it in his own name, mentioning in the body of it, however, that he received the money "for" or "on account of" his principal.

The first form is more suitable for an agent who acts as a mere messenger to take the money and is not authorized to assume any responsibility or exercise any discretion in respect to the case. Clerks in stores are of this class.

The last form is suitable for an agent of more extended powers: of this class are lawyers, to whom collections are intrusted.

One of the most important of all the special clauses in the receipt is that which defines the debt or purpose to which the payment is to be applied.

**Payments upon Account.**—When, for want of time, or other circumstances, a payment is made in part, or with the intention to leave the application of it to future adjustment, it is common to state that the money was "received on account."

**Payments upon a Specified Debt.**—When a payment is made, and the debt intended to be paid is clearly distinguished, the receipt, as evidence of application, can only be set aside by proof of fraud or serious mistake.

**Payments in Full.**—A receipt for a sum "in full" of a debt mentioned is evidence of something more than the mere payment of that sum. The law infers from it the adjustment of the amount due, after consideration of the rights of both parties, and payment of the sum specified as final satisfaction of those rights. Receipts "*in full of all accounts*" do not affect claims which are not properly matters of account. Receipts "*in full of all demands*" prevent any further claim for any de-

mand whatever, existing and known, or which ought to have been known, to the parties at the time, unless some serious or excusable mistake can be shown.

**Payments to be Accounted for.**—As the law presumes that when money is paid it is paid in satisfaction of a debt, it is desirable, when money is received as a loan or deposit, or to be used or paid out for the benefit of the party paying it, to embody in the receipt an admission of the purpose for which it is received, somewhat as follows :

Received, etc., One Hundred Dollars, to be repaid with interest ; Received, etc., One Hundred Dollars, to be accounted for, or returned ; Received, etc., One Hundred Dollars, to be expended in purchasing, etc.

Care should be taken in drawing a receipt when the transaction involves an agreement, because, in case of legal controversy, no explanation inconsistent with its language can be given.

If a person to whom a note is offered in payment consents to receive the note only upon the understanding that if it be not paid when due he shall return it to the debtor and renew his original claim, it is advisable to state the medium of payment, and that “*when paid*” it will be in full satisfaction for the debt.

A check made payable to the creditor’s order is equivalent to a receipt for the amount, as the money cannot be obtained until the check has been properly indorsed.

It is not usual to take a receipt on paying a note, draft, or other instrument indorsed by the payee, because the instrument *itself*, with the indorsement, is returned, and thus becomes a receipt.

Partial payments of a bond should be indorsed on the bond, and a receipt should also be taken by *the party making* the payment.

A receipt given by a person who makes his mark instead of writing his name should be witnessed.

A receipt for money paid to an estate is good when signed by but one executor ; although it is well to have the signature of both.

When a bill which is receipted is retained by the person to

whom it is presented, and payment is not made, the signature at the foot of the bill should be torn off or defaced. If payment is refused after a receipt has been delivered, evidence may be given to that effect.

**Sealed or Special Receipts.**—The Sealed or Special Receipt is, in general, conclusive and absolutely binding. Deeds signed and sealed, which include "the receipt of which is hereby acknowledged," are of this character. (*See page 367.*)

FORMS OF RECEIPTS.

Receipt for Payment on Account.

*Received, Philadelphia, July 5, 1882, from S. H. Crittenden & Co., Two Hundred and Fifty Dollars on account.*

\$250

Ringwalt & Brown.

Receipt in Settlement of Account.

*Philadelphia, Nov. 11, 1882.*

*Received from William H. Brown One Hundred and Twenty-Five  $\frac{50}{100}$  Dollars, in settlement of account to date.*

\$125  $\frac{50}{100}$ .

Stewart, Wallace, Atkinson & Co.

Receipt in Full of all Demands.

*St. Louis, Jan. 10, 1882. Received of Henry D. Holmes One Thousand Dollars, in full of all Demands.*

\$1000.

John Andrews.

Receipt for a Particular Bill.

*Rec'd, New York, July 2, 1882, from James G. Atwater, One Hundred and Thirty-Five  $\frac{62}{100}$  Dollars, in payment for a bill of Broadcloth of this date.*

\$135  $\frac{62}{100}$ .

A. T. Stewart & Co.,

per B. J. Yates.

## Receipt for a Note.

*Baltimore, May 7, 1882.*

*Rec'd from Messrs. Watson, Gray & Co. their Note of this date, at three months, our favor, for Twelve Hundred and Twenty-Five  $\frac{75}{100}$  Dollars, which, when paid, will be in full for account rendered to 1st instant.*

\$1225  $\frac{75}{100}$ .

*James H. Johnson.*

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## Receipt for Rent.

*Rec'd, Rochester, March 6, 1882, from Porter K. Smith, One Hundred and Twenty-Five Dollars, in full for one quarter's rent of House No. 10 St. Joseph St.; due on 1st inst.*

\$125.

*George H. Matthews, Trustee.*

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## Receipt for Interest due on a Bond.

*Received, Boston, September 18, 1882, of Gilbert Lawrence, One Hundred and Eighty Dollars, in full for six months' interest due this day, on his Bond to me, bearing date Sept. 18, 1880, for Six Thousand Dollars.*

\$180.

*John W. Thornton.*

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## Receipt for Services.

*Rec'd, Lowell, June 13, 1882, from Joseph T. Chester & Co., Ninety-Six Dollars, in full for services to date.*

\$96.

*Henry T. Chase.*

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## Indorsement of a Partial Payment on a Note.

*Rec'd, Phila., March 6, 1882, on account of the within Note, Six Hundred Dollars.*

\$600.

*Walter H. DeHaven.*

**Receipt for Payment by the Hand of a Third Party.**

*Rec'd, Memphis, Dec. 30, 1881, from Leonard W. Bailey & Co., by the hand of Samuel Trumpler, Four Hundred Dollars, in full for proceeds of sales of Iron, Invoice bearing date of Nov. 10, 1881.*

\$400.

*George S. Powell.*

**Receipt for Borrowed Money.**

(Or Borrowed-Money Due Bill.)

\$300.

*Syracuse, Mar. 17, 1882.*

*Borrowed and received, from William S. Balch, Three Hundred Dollars, which I promise to pay on demand, with interest.*

*Daniel S. Browning.*

**Shipping Receipt.**

| <i>Albany, Sept. 10, 1882.</i> | <i>Albany, Sept. 10, 1882.</i>                    |
|--------------------------------|---|
| <i>Shipped on board</i>        | <i>Received from Charles Sansom &amp; Co., in</i> |
|                                | <i>good order, on board the "Isaac Newton,"</i>   |
| <i>Bound for</i>               | <i>bound for New York, the packages marked</i>    |
|                                | <i>and entered as below:</i>                      |
| <i>Packages</i>                | <i>Marks.</i>                                     |
|                                | <i>M. T. 10 sacks Garden Seeds.</i>               |
| <i>Marks</i>                   | <i>C. H. 100 bbls. Oswego Flour.</i>              |
|                                | <i>Robert L. Brown, Ag't.</i>                     |

When a large number of hands are employed, or when payments to a large number of persons are to be made, it is usual to have forms of receipts printed, leaving the date and amount to be filled according to circumstances; or a large book ruled in the manner shown below. Some take a receipt at every payment; while others take receipts only quarterly, yearly, or at other stated intervals, or when business relations are dissolved, and then in full to date of receipt.

The following is a convenient form when a large number of persons are paid :

*We, the undersigned, do hereby severally acknowledge that we have received from Matthew Baldwin & Co. the sums set opposite our respective names, in full for services to date.*

| No. | Date. |         | Amount.                             |      |    | Signatures.        |
|-----|-------|---------|-------------------------------------|------|----|--------------------|
| 1   | 1882  | July 20 | Forty-Five Dollars.                 | 45   | 00 | Joseph L. Barrett. |
| 2   | "     | "       | Thirty-Seven $\frac{5}{100}$ Dolls. | 37   | 50 | Thomas P. Jones.   |
| 3   | "     | "       | Twelve                              | 12   | 00 | Samuel G. Brown.   |
|     |       |         |                                     | \$94 | 50 |                    |

### Form for Dividend List of Joint Stock Companies.

*We, the subscribers, severally acknowledge that we have received from the Treasurer of the Saratoga Fire Insurance Co., of New York, the sums set opposite our respective names, in full for Dividend on all Stock of said Company held by us.*

| NAMES.           | No. of Shares. | Dividend. | Arrears of Dividend. | Date of Receipt. |    | SIGNATURES.      |
|------------------|----------------|-----------|----------------------|------------------|----|------------------|
| Chas. L. Somers, | 100            | \$40      |                      | 1882.            | 15 | Chas. L. Somers. |
| Thos. C. Smith,  | 50             | 20        | \$20                 | June             | 16 | Thos. C. Smith.  |
| Jos. T. King,    | 200            | 80        |                      |                  |    |                  |
| Philip S. Hall,  | 150            | 60        |                      |                  |    |                  |

### Instalment Receipt.

|                             |   |                    |
|-----------------------------|---|--------------------|
| No. 13. INSTALMENT RECEIPT. | \$2500.   | 200 Shares.        |
|                             | <b>WASHINGTON R. R. COMPANY.</b>  |                    |
|                             | <p><i>Received, Washington, Apr. 11, 1882, of S. J. Andrews, Two Thousand Five Hundred Dollars, being Twenty-Five Dollars per share, and the Third Instalment on Two Hundred Shares of the Capital Stock of the Washington Railroad Company; for which said shares a full Certificate will be given upon payment of all instalments due thereon, and the surrender of this Certificate.</i></p> |                    |
|                             | Leonard R. Cushing,   | Daniel E. Eveland, |
|                             | Secretary.  | President.         |

## BOOK ACCOUNTS.



Original Entries are evidence of the sale and delivery of goods and of work done.

Entries of transactions should be made at or near the time of their occurrence.

The time to make a charge against a purchaser is when the goods are ready for delivery.

Entries, to be admissible as evidence, should be made by a proper person, and be without erasure, alteration, or interlineation.

Mistakes should be corrected by marking the erroneous entry *void*, and then making a correct entry ; or, if the entry has been transferred to other books, by making another entry in explanation.

Items and particulars should be specified, as a general charge cannot be supported by this kind of evidence. The entry must be made for the purpose of charging the debtor ; a mere memorandum for any other purpose is insufficient.

As a general rule, copies of all important papers, such as letters, orders, accounts current, and account sales, should be kept, as they may be required for proof or reference ; but, usually, a copy is not a voucher, and nothing but the original paper will answer.

To collect a debt on the evidence of a book account, from a person in a distant place, a copy of the account should be made out, and accompanied with an affidavit in the usual form, setting forth, 1st, that the above copy of account is correctly taken from the book of original entries ; 2d, that the charges were made at or about the times of their respective dates ; 3d, that the goods were sold and delivered at or about the time the charges were made ; 4th, that the charges are correct and the account just ; and, 5th, that the person named is not entitled to any credits. This affidavit should be sworn to before a magistrate or commissioner, and will save the trouble of producing the books. (*See Affidavit, page 370.*)

## BILLS, INVOICES, AND STATEMENTS.



A Bill is a written description of particulars or items.

A Bill of Goods, or Bill of Parcels, is a description of the quantity and price of goods sold, with the time of the transaction and the names of the purchaser and seller.

The term Invoice is applied more particularly to bills which contain a full account of goods or merchandise in which the marks, numbers, contents, and value of each package are described, together with the charges for commission, insurance, packing, etc.

An Outward Invoice is an invoice of goods sent to a distant place to be sold for the consignor.

A Statement is a synopsis of an account, or a brief enumeration of bills which have been purchased within a certain time. Some mercantile houses send statements monthly, or at other regular periods, to their customers who purchase on credit, that a comparison of accounts may be made, and that if any error exists it may be remedied in time.

## FORMS OF BILLS.

## 1. Bill, unreceipted.

*Rochester, March 18, 1882.*

*Mr. Henry L. Stone,*

*Bought of George S. Thompson.*

|                            |   |                  |      |    |
|----------------------------|---|------------------|------|----|
| 10 lbs. Java Coffee,       | @ | .40              | 4    | 00 |
| 5 " Green Tea,             | " | 1.20             | 6    | 00 |
| 14 " Pulverized Sugar,     | " | .12              | 1    | 68 |
| 46 yds. Muslin (Wamsutta), | " | .12 <sup>2</sup> | 5    | 75 |
| 17 " Flannel,              | " | .45              | 7    | 65 |
| 1 doz. Linen Hdkfs.,       |   |                  | 3    | 00 |
| 12 yds. Mous. de laine,    | " | .20              | 2    | 40 |
|                            |   |                  | \$50 | 48 |





## 4. Bill receipted by Clerk.

No claims allowed unless made within Five Days after Receipt of Goods.

Philadelphia, 11mo. 7, 1882.

Mr. Seth W. Osborn,

O. B. 55, page 150.

TERMS, 4 months.

Bought of J. M. &amp; T. H. Saunders.

| Packages. | Nos. |                                    |           |       |    |  |
|-----------|------|------------------------------------|-----------|-------|----|--|
| 365       | 20   | 2 doz. Men's Blk. Cuser. Hats,     | @ \$24.00 | \$48  | 00 |  |
| "         | 16   | 6 " " " Wool " "                   | " 18.00   | 108   | 00 |  |
| "         | 12   | 3 " Boys' Drab " " "               | " 15.00   | 45    | 00 |  |
| "         | 21   | 3 " Child's Fancy Wool Hats,       | " 15.00   | 45    | 00 |  |
| "         | 17   | 3 " Men's White Canton Hats,       | " 13.50   | 40    | 50 |  |
| 1520      |      | 60 prs. Women's Calf Pegged Boots, | " 2.25    | 135   | 00 |  |
| 1350      |      | 96 " Misses' " " Balmorals,        | " 1.15    | 110   | 40 |  |
| 1216      |      | 36 " Women's Morocco Welt " "      | " 2.10    | 75    | 60 |  |
| 1301      |      | 36 " Child's Kid Pump Boots,       | " .60     | 21    | 60 |  |
|           |      | 2 Cases,                           |           | 1     | 50 |  |
|           |      | Received payment,                  |           | \$630 | 60 |  |
|           |      | J. M. & T. H. Saunders,            |           |       |    |  |
|           |      | per J. L. Gurney.                  |           |       |    |  |

## 5. Bill paid by Note.

PLEASE EXAMINE PACKAGES CAREFULLY FOR MISSING ARTICLES.

New York, January 13, 1882.

Messrs. Geo. W. McWilliams &amp; Co.,

O. B. 4, page 75.

Bought of Fisher &amp; Collins.

|                 |   |                     |                    |                    |                   |                  |
|-----------------|---|---------------------|--------------------|--------------------|-------------------|------------------|
| 7               | Doz. Edg'd Muffins,                       | $\frac{2}{1.00}$    | $\frac{4}{1.20}$   | $\frac{1}{1.35}$   | \$8               | 15               |
| 2               | Sets W. Gran. Tea Sets, 46 ps., @ \$8.50, |                     |                    |                    | 17                | 00               |
| 2               | Doz. Mococo Pitchers,                     | $\frac{1}{4.50}$    | $\frac{1}{7.00}$   |                    | 11                | 50               |
| 6               | " Table Tumblers, @ 1.25,                 |                     |                    |                    | 7                 | 50               |
| 50              | " W. Gran. Dishes,                        | $\frac{10}{.50}$    | $\frac{15}{1.00}$  | $\frac{10}{1.50}$  | $\frac{10}{2.00}$ | $\frac{5}{3.00}$ |
| 20              | Sets " Teas, @ 1.10,                      |                     |                    |                    | 22                | 00               |
| 1 $\frac{1}{4}$ | Doz. Edg'd Bakers,                        | $\frac{1}{2}$       | $\frac{1}{2}$      | $\frac{1}{4}$      | 4                 | 75               |
|                 |   | $\frac{2.00}{2.00}$ | $\frac{.25}{4.50}$ | $\frac{.50}{6.00}$ |                   |                  |
|                 | Crate, 2.00                               |                     |                    |                    | 2                 | 75               |
|                 | Box, .25 and Portorage, .50               |                     |                    |                    |                   |                  |
|                 | Rec'd payment by Note at 4 mos.,          |                     |                    |                    | \$143             | 65               |
|                 | Fisher & Collins.                         |                     |                    |                    |                   |                  |

Bills for Services, etc.

Worcester, July 7, 1882.

6. Mr. James L. Rushton,

To Frederick T. Stone, Dr.

|       |    |                                      |      |    |
|-------|----|--------------------------------------|------|----|
| 1882. |    |                                      |      |    |
| Jan.  | 7  | For Professional Services in Family, | \$10 | 00 |
| "     | 20 | " 5 visits to son, Charles Rushton,  | 5    | 00 |
| May   | 10 | " 3 " " Henry L. Rushton,            | 3    | 00 |
|       |    |                                      | \$18 | 00 |

Buffalo, August 19, 1882.

7. Mr. John H. Wagner,

To Wm. H. Turner, Dr.

|       |    |                                       |         |    |
|-------|----|---------------------------------------|---------|----|
| 1882. |    |                                       |         |    |
| May   | 11 | For repairing House, as per Contract, | \$25.00 |    |
| "     | "  | " 800 feet Pine Boards, @ \$8,        | 6.40    |    |
| "     | "  | " Lock and Key for door,              | 2.25    |    |
| "     | "  | " Nails, Hooks, etc.,                 | 1.00    |    |
|       |    |                                       | \$34    | 65 |
|       |    | Received payment,                     |         |    |
|       |    | W. H. Turner.                         |         |    |

Chicago, July 3, 1882.

8. Mr. Owen T. Jones,

To Henry G. Langdon, Dr.

|  |  |   |         |         |
|--|--|---|---------|---------|
|  |  | For Instruction of son, William T. Jones,   |         |         |
|  |  | in English branches, 3 mos.,                | \$25.00 |         |
|  |  | in Latin, "                                 | 20.00   | \$45 00 |
|  |  | " Instruction of daughter, Louisa J. Jones, |         |         |
|  |  | in English branches, 3 mos.,                | \$25.00 |         |
|  |  | in Music, "                                 | 15.00   |         |
|  |  | " Use of Piano,                             | 10.00   | 50 00   |
|  |  | " Books and Stationery furnished during     |         |         |
|  |  | the Term,                                   | 3       | 50      |
|  |  |   | \$98    | 50      |
|  |  | Received payment,                           |         |         |
|  |  | Henry G. Langdon,                           |         |         |
|  |  | per S. Y. Langdon.                          |         |         |

## 9. Items of an Account.

Mechanicsville, Jan. 1, 1882.

Mr. S. B. Morehouse,

To O. Tompkins &amp; Co., Dr.

|       |    |  |   |         |       |    |  |  |  |
|-------|----|--|---|---------|-------|----|--|--|--|
| 1882. |    |  |   |         |       |    |  |  |  |
| Apr.  | 5  | To 10 bbls. Genesee Flour, extra,        | @ | \$7.50  | \$75  | 00 |  |  |  |
| May   | 9  | " 10 lbs. Pearl Starch,                  | " | .18     | 1     | 80 |  |  |  |
| June  | 16 | " 30 " English Breakfast Tea,            | " | 1.50    | 45    | 00 |  |  |  |
| Sept. | 14 | " 2 bbls. Prime Pork,                    | " | 17.50   | 35    | 00 |  |  |  |
|       |    |  |   |         | \$156 | 80 |  |  |  |
|       |    | Cr.                                      |   |         |       |    |  |  |  |
| May   | 5  | By 17 yds. English Broadcloth, @ \$3.00, |   | \$51.00 |       |    |  |  |  |
| "     | 10 | " 25 " French Chintz, " .40,             |   | 10.00   |       |    |  |  |  |
| July  | 11 | " 12 " English Beaver Cloth, " 3.00,     |   | 36.00   | 97    | 00 |  |  |  |
|       |    | Balance due,                             |   |         | \$59  | 80 |  |  |  |
|       |    | Settled by due-bill,                     |   |         |       |    |  |  |  |
|       |    | O. Tompkins & Co.                        |   |         |       |    |  |  |  |

See also page 141.

## INVOICES—DRY GOODS.

Cincinnati, Jan. 17, 1882.

Messrs. Leonard &amp; Curtis,

Bo't of Joseph Cushing &amp; Co.

TERMS, 3 mos. Note to your own order.

|         |      |   |          |  |  |
|---------|------|---|----------|--|--|
| L. & C. | 304  | 2 cases Merrimac Prints, 80 ps., 2804 yds., @ | .17      |  |  |
| "       | 312  | 1 case Satinets, 450 yds.,                    | " .78    |  |  |
|         | 540  | 5 ps. Extra Black Cassimere, 180 yds.,        | " \$2.75 |  |  |
|         | 17   | 10 " Satin Stripe Muslin, 200 "               | " 1.30   |  |  |
|         | 157  | 40 Check Square Shawls,                       | " 2.13   |  |  |
|         | 15   | 6 Imperial Long "                             | " 11.00  |  |  |
|         | 801  | 3 ps. Solferino Opera Cloth, 90 yds.,         | " .85    |  |  |
|         | 4267 | 12 Ladies' Mourning Long Shawls, 60 x 120, "  | 9.00     |  |  |
| No. 1   |      | 2 ps. Taffeta Ribbons,                        | " 1.50   |  |  |
|         |      | 5 " Buff Chambrays, 155 yds.,                 | " .42    |  |  |
|         | 143  | 2 " Printed Plaid Flannel, 90 yds.,           | " .52    |  |  |
| E. C.   | 46   | 15 " Plain Mousseline de Laines,              |          |  |  |
|         |      | metres 674.1 = 730 1/4 yds.,                  | " 23 1/2 |  |  |
|         |      | Rec'd payment,                                |          |  |  |
|         |      | Jos. Cushing & Co.,                           |          |  |  |
|         |      | per L. R. Taylor.                             |          |  |  |

*Invoice of TWO packages of Merchandise purchased by W. B. LONGWORTH & Co., and forwarded to B. G. BABCOCK, Liverpool, for shipment per "Kangaroo" S. S., bound for NEW YORK, for account and risk of MESSRS. HOMER, COLLADAY & Co., Philadelphia, and to them consigned.*

| H    |        |        |   |     |           | £  | s. | d. |      |       |
|------|--------|--------|---|-----|-----------|----|----|----|------|-------|
| # 30 | 77 1/2 | 16     | Fancy Wool Long Shawls,                   | 70  | 2 1/2-    | 34 |    |    |      |       |
|      |        |        | " " " "                                   | 18  | 17/-      | 15 | 6  |    |      |       |
|      |        |        | " " Square "                              | 12  | 9/-       | 6  | 8  |    |      |       |
|      | 100    | 100    | Broche Borders, yds.,                     | 200 | 1/-       | 10 |    |    |      |       |
|      | 12 1/4 | 75 1/4 |   |     |           |    |    |    |      |       |
|      | 2301   |        | " " "                                     | 200 | 10 1/2 d. | 8  | 15 |    |      |       |
|      | 2302   |        | " " "                                     | 200 | 8 d.      | 6  | 13 | 4  |      |       |
|      |        |        | Cases, Packing, Oil-Cloth, etc.,          |     |           | 19 | 10 |    | 151  | 2 8   |
| # 31 | 16     |        | Fancy Wool Long Shawls,                   | 72  | 23/-      | 82 | 16 |    |      |       |
|      |        |        | " " " "                                   | 48  | 12/-      | 28 | 16 |    |      |       |
|      |        |        | Case, Packing, etc.,                      |     |           | 19 | 6  |    | 112  | 11 6  |
|      |        |        |   |     |           |    |    |    | 243  | 13 8  |
|      |        |        | Discount on £241 1 1/2 s. 9 d., @ 2 1/2 % |     |           |    |    |    | 6    | 10    |
|      |        |        |   |     |           |    |    |    | 237  | 12 10 |
|      |        |        | Charges, Cartage, 1/8, Commission         |     |           |    |    |    |      |       |
|      |        |        | 1 1/2 per cent., £3 11 s. 4 d.,           |     |           |    |    |    | 3    | 12 10 |
|      |        |        | Cash, 1st Sept., 1882,                    |     |           |    |    |    | £241 | 5 8   |
|      |        |        | E. E.                                     |     |           |    |    |    |      |       |
|      |        |        | Glasgow, 11th August, 1882.               |     |           |    |    |    |      |       |
|      |        |        | W. B. Longworth & Co.                     |     |           |    |    |    |      |       |

Other invoices may be found under PROFIT AND LOSS, pages 180 to 200.

## MONTHLY STATEMENT.

### Monthly Statement.

*Boston, Jan. 31, 1882.*

*Messrs. B. H. Bradford & Co.,*

*To A. A. Lawrence & Co., Dr.*

|       |    |   |  |  |  |              |           |
|-------|----|---|--|--|--|--------------|-----------|
| 1882. |    |   |  |  |  |              |           |
| Jan.  | 4  | To Mdse., as per Bill rendered, @ 3 months, |  |  |  | \$75         | 00        |
| "     | 17 | " " " " " 3 "                               |  |  |  | 132          | 00        |
| "     | 26 | " " " " " 60 days,                          |  |  |  | 318          | 00        |
| "     | 29 | " " " " " 3 months,                         |  |  |  | 123          | 75        |
|       |    |   |  |  |  | <b>\$648</b> | <b>75</b> |

## OUTWARD INVOICES.

*Invoice of Coffee and Tea shipped by CHAS. FRENCH & Co., per Union Transportation Co., and consigned to S. C. ATKINSON & Co., Sacramento, Cal., to be sold for account and risk of shippers.*

|            |                                      |  |  |  |  |
|------------|--------------------------------------|--|--|--|--|
| S. C. A.   | 600 Bags Rio Coffee,                 |  |  |  |  |
| # 1 to 600 | 79,314 lbs., at \$,                  |  |  |  |  |
| X. L.      | 100 Hly. Chests Japan Tea,           |  |  |  |  |
| # 1 to 100 | 5460 — 1300 = 4160 lbs., @           |  |  |  |  |
|            | Charges.                             |  |  |  |  |
|            | Drayage, 213.00                      |  |  |  |  |
|            | Ins. on \$ @ $\frac{3}{4}\%$         |  |  |  |  |
|            | Commission on \$ @ 2 $\frac{1}{2}\%$ |  |  |  |  |
|            | Boston, Sept. 24, 1882.              |  |  |  |  |
|            | Chas. French & Co.                   |  |  |  |  |

*Invoice of Flour and Wheat shipped by R. L. MARTIN & Co., on board ship "Vulcan," Robson, Master, and consigned to BURTON & FISHER, Liverpool, England, for joint account of shippers and consignees.*

|       |  |        |    |          |    |
|-------|--|--------|----|----------|----|
| B. F. | 1000 bbls. Minn. Extra Flour, @ 7.50     | \$7500 | 00 |          |    |
| D.D.  | 1000 " St. Louis, " 7.25                 | 7250   | 00 | \$14,750 | 00 |
|       | Charges.                                 |        |    |          |    |
|       | Inspection, \$30 Lining, \$50            | 80     | 00 |          |    |
|       | Cartage, \$80 Insurance, \$73.75         | 153    | 75 |          |    |
|       | Brokerage for purchasing, \$14,750 @ 1%. | 147    | 50 | 381      | 25 |
|       | E. E.                                    |        |    | \$15,131 | 25 |
|       | Philadelphia, Oct. 17, 1882.             |        |    |          |    |
|       | R. L. Martin & Co.                       |        |    |          |    |

## BILLS OF LADING.

**A Bill of Lading** is a formal receipt subscribed by the master of a ship, or other common carrier, acknowledging the receipt of goods intrusted to him for transportation, and binding himself, under certain exceptions, to deliver them, in like good condition as received, at the place and to the person named in the bill, or his assigns, for a remuneration or freightage. The bill of lading is the evidence of shipment and the title to the goods shipped, and may be indorsed or transferred to other parties.

Three sets are usually made out : one to be sent to the person to whom the goods are consigned, one to be held by the person shipping the goods, and a third to be retained by the carrier, or master of the vessel. The bills of lading contain a description of the packages shipped, including their number, marks, weights, etc.

**Common Carriers** are those who hold themselves out to carry all goods intrusted to them, or all goods of a particular kind. They are of two kinds,—inland carriers by land or water, and carriers by sea. They are answerable for all losses which do not fall within the excepted cases of inevitable accident and the acts of the public enemies of the country. The carrier may limit his responsibility by agreement with his customer ; but he cannot exempt himself by notice or agreement from responsibility for *actual negligence*. He has a lien on the goods carried, and may retain them until he has been paid his freight.

**Primage** is an allowance made for loading the goods. The term “Average” refers to general or marine average, in which, if loss arise during the voyage, the cargo is required to bear a proportionate share.

**A Manifest** is a list containing the marks, description, and number of packages of the ship’s cargo, together with the names of the shippers and consignees, and must be certified by the master of the vessel before the collector of customs or the consul.

**A Consul** is an officer appointed by Government to reside in a foreign country, for the purpose of protecting the commercial interests of the subjects of his own nation.

## Bill of Lading, Signed by Master of Vessel.

Shipped,

P. M.  
P.

18 Bales.

# 1/18.

Rate 20/-

|          |    |    |      |
|----------|----|----|------|
|          | £  | s. | d.   |
| Freight, | 5  | 5  | 9    |
| Primage, |    | 5  | 3    |
|          | £5 |    | 11s. |

In good order and well-conditioned, by **B. Gallaway, Jr.**, as Agent, in and upon the good ship called the **Kathleen**, whereof is Master for this present voyage, **U. E. Roberts**, and now riding at anchor in the river Thames, and bound for **Philadelphia**, via Falmouth, **Eighteen Bales Merchandise**, being marked and numbered as in the margin, and to be delivered in the like good order and well-conditioned, at the aforesaid Port of **Philadelphia** (*the act of God, the Queen's enemies, fire, and all and every other dangers and accidents of the seas, rivers, and navigation, of whatever nature and kind soever, excepted*), unto **Mr. Porter Morgan, Philadelphia**, or to his assigns, he or they paying freight for the said goods, **£5 11s.**, in full. Primage and Average accustomed.

In Witness whereof, the Master or Purser of the said Ship hath affirmed to **three** Bills of Lading, all of this tenor and date, the one of which Bills being accomplished, the others to stand void.

Weight and contents unknown; and not accountable for leakage, breakage, or rust. Freight payable at the current rate of exchange on the day the ship enters at the Custom-House.

Dated in LONDON, this 23d day of Dec., 1882.

Contents unknown.

U. E. ROBERTS,  
*Master.*

## Bill of Lading, Signed by Clerk of R. R. Co.

Camden &amp; Amboy Railroad and Transportation Company.

*Philadelphia, Feb. 24, 1882.*

Received, of Messrs. Barclay & Barclay,  
30 casks Linseed Oil,

MARKED:—H. L. T.—# 1 to 30.

To be transported to *New York*, and delivered to  
*Mr. H. L. Turner*, or order, upon the following

TERMS:

[Here the conditions are inserted.]

W. P. Murphy,  
*For the Company.*



## Steamboat Bill of Lading.

Received by the **Wilmington Steamboat Line**, in apparently good order, from *H. Y. Heald*, marked and entered as below (contents unknown), which we promise to deliver at **Wilmington** (breakage and leakage excepted), and not being responsible, if lost, stolen, or damaged, beyond the value of Fifty Dollars per package.

1 Case Merchandise.

MARKED :—*George Danby,*  
*Wilmington, Del.*

*Philadelphia, Jan. 19, 1882.*

*P. T. SIMPSON, Agent.*

## Freight Bill.

FORM No. 69.—SERIES B.

No. 12118.

*Philadelphia, Nov. 8, 1882.*

Mr. *Robert B. Stewart,*

To **PENNSYLVANIA R. R. CO.,** DR.

For Freight from ..... *Mill Creek* ..... on

|                 | Weight. | Rate. | Freight. |    | Expenses. | Total. |    |
|-----------------|---------|-------|----------|----|-----------|--------|----|
| 3 boxes Apples, | 1935    | 56    | 10       | 83 | 57        | 11     | 40 |
| 4 " Mdse.,      | 1450    | 60    | 8        | 70 | 50        | 9      | 20 |
|                 |         |       |          |    |           | \$20   | 60 |

Rec'd payment for the Company,

*Thos. Y. Murray.*

## Warehouse Receipt.

*Syracuse, June 18, 1882.*

Delivered to **John Cottrell & Co.**, in good order, for which they have paid the charges thereon.

| Marks.      | Articles.               | Quantity. | Charges. |    |
|-------------|-------------------------|-----------|----------|----|
| J. C. & Co. |                         |           |          |    |
| X. L.       |                         |           |          |    |
| # 1 to 20   | Oswego Flour, extra,    | 20 bbls.  |          |    |
| # 20 " 30   | Corn Starch,            | 10 "      |          |    |
|             | Freight from Oswego,    |           | 1        | 50 |
|             | Drayage, Storage, etc., |           | 3        | 00 |
|             | T. & L. Mosier.         |           | \$4      | 50 |

## ACCOUNT SALES.

An **Account of Sales** is a detailed statement of goods sold and the charges incurred thereon, and is made for the purpose of showing the net proceeds of sales. When goods have been sold on commission, the agent or commission merchant makes out an account sales, to be sent to the consignor, or person for whom the goods were sold.

When only a single consignment is sold, the account sales is made out immediately; and sometimes, as at the first of the year, of the part that has been sold. Manufacturers who consign goods regularly require account sales at stated periods, as monthly or quarterly.

Account Sales are made out in various forms; that form being used which is most convenient for the branch of business in which it is used. Sometimes they are made out in the form of a ledger account; the quantity of goods sold, with their marks, prices, etc., being entered on the credit side, and the various charges on the debit side. The difference between the two sides exhibits the net proceeds, and is entered on the smaller side, to produce a balance.

Another form, and the one which is generally adopted, is to enter the sales, with all the particulars, first, and the charges underneath.

When the goods are not all sold, a minute of those still on hand should accompany the account sales.

To make out an account sales, turn to the consignment account in the ledger, and from thence to the original entries, to obtain all the items affecting the account. When the goods are sold for cash, or when the consignor guarantees the sale, it is not necessary to give the names of the purchasers; although this is frequently done.

A *del-credere* commission, or guarantee, is a commission charged for becoming responsible for the debts of those who purchase the goods on credit.

Account Sales are averaged to find the date when the proceeds may be paid without loss of interest to either party. (*See Average of Accounts, page 162.*)

*Sales of {200 bus. Wheat,  
160 bbls. Flour,} received per Barque "Aurora," for Account  
of James T. Hoyt, Berlin, Md.*

|         | To whom sold.         | Description.                             | Price.  |           |
|---------|-----------------------|--|---------|-----------|
| 1882.   |                       |  |         |           |
| Dec. 19 | Jefferson Andrews,    | 25 bus. Ohio Wheat,                      | 1.15    | \$28 75   |
| 1883.   |                       |  |         |           |
| Jan. 5  | R. J. Long,           | 50 bbls. Elm Grove Fam. Flour,           | 9.50    | 47 50     |
| " 8     | Chas. S. Brown,       | 100 bus. Kentucky Wheat,                 | 1.20    | 120 00    |
| " 18    | L. S. Harris & Co.,   | 20 " Ohio "                              | 1.18    | 23 60     |
| " "     | "                     | 75 bbls. Oregon Fam. Flour, Ex.,         | 8.50    | 637 50    |
| " 25    | Henry G. Stone & Co., | 55 bus. Ohio Wheat,                      | 1.00    | 55 00     |
| " "     | "                     | 25 bbls. Flour, Grant's Mills,           | 11.00   | 275 00    |
|         |                       |  |         | \$1187 35 |
|         |                       | Charges.                                 |         |           |
|         |                       | Freight and Drayage,                     | \$45.00 |           |
|         |                       | Insurance on \$1000, @ 1¼%,              | 12.50   |           |
|         |                       | Storage and Labor,                       | 7.25    |           |
|         |                       | Commission and Guarantee, 5% on 1187.35  | 59.37   | 124 12    |
|         |                       | Net Proceeds due per average, ———, 1883, |         | \$1063 23 |
|         |                       | Leonard B. Hudson.                       |         |           |
|         |                       | New York, Jan. 28, 1883.                 |         |           |

*Account Sales of 75 Bales of Wool received per Pennsylvania Railroad, and sold for Account of Messrs. Smith & Williams, Salem, Columbiana Co., Ohio.*

|         |                                    |   |          |    |
|---------|------------------------------------|---|----------|----|
| 1882.   |                                    |   |          |    |
| Nov. 10 | Three-quarter blood Merino Fleece, | 30 days,  |          |    |
|         | Net 9238 lbs., @ 60c.,             |   | \$5542   | 80 |
| Dec. 15 | Half-blood Merino Fleece,          | "   |          |    |
|         | Net 2638 lbs., @ 55c.,             |   | 1450     | 90 |
| " "     | Unwashed Merino Fleece,            | 30 days,  |          |    |
|         | Net, 240                           |   |          |    |
|         | ½ discount, 80                     | 160 lbs., @ 55c.,   | 88       | 00 |
| 1883.   |                                    |   |          |    |
| Jan. 5  | Common and quarter-blood Fleece,   | 30 days,  |          |    |
|         | Net 985 lbs., @ 50c.,              |   | 492      | 50 |
|         |                                    |   | \$7574   | 20 |
|         |                                    | Charges.  |          |    |
|         |                                    | Freight and Drayage,  | \$192.35 |    |
|         |                                    | Commission, including Insurance, Storage,<br>and Labor, 2 cents per lb. on 13,101 lbs., | 262.02   |    |
|         |                                    | Net Proceeds due Dec. 22, 1882,   | 454      | 35 |
|         |                                    |   | \$7119   | 85 |
|         | E. E.                              | Thaw & Walker.  |          |    |
|         | Philadelphia, Jan. 10, 1883.       |   |          |    |

*See also pages 162 and 163.*

## ACCOUNTS CURRENT.



**Accounts Current** are statements in detail of accounts which have been open or running from one time to another. They are usually made out twice a year, or whenever circumstances require, by the parties desiring settlement.

The object of an **Account Current** is to furnish the person to whom it is sent a statement, that he may know the extent of his dealings, and what balance may be due from him to settle his account.

**Accounts Current** are drawn from the accounts in the **Ledger**, with which they must agree, and should contain a description of every transaction, with date, items, and amounts, as expressed in the books of original entry, allowing for the difference of style. When particulars are not supplied, reference should be made to the entries or papers in which they may be found. Interest is allowed, or not, according to custom or the understanding between the parties. The time for which interest is calculated is counted from the date when the amount is due, or equivalent to cash, to the date of settlement. For the different methods of calculating the interest, see **INTEREST ACCOUNTS**. **Accounts Current** are sometimes averaged as in **Average of Accounts**.

If there are errors in an **Account Current** received, it should be objected to within a reasonable time, or it becomes an **Account Stated**, which does not require a proof of items.

Mistakes in calculation can be corrected at any time. Gross errors, or any fraud or misrepresentation that can be proved, will be allowed to modify the account. The giving of a note or bill may be evidence of the acceptance of an account, and render it conclusive.

The letters **E. E.** and **E. O. E.**, appended to invoices and accounts, are for the purpose of intimating the right of correcting errors or of supplying omissions.

For additional **Accounts Current**, see pages 141 and 143; and for finding interest on **English Accounts**, see *Interest in England*.



## ORDERS.



**An Order** is a written request to deliver money or goods to some person mentioned, or to his order, or to the bearer, on account of the person signing the request. It is used by the person receiving it as a voucher that the person signing it is responsible, and that the thing or things mentioned have been delivered. Orders may be made negotiable; but the persons on whom they are drawn are not under obligation to pay them unless they have been accepted.

## Orders for Money.

*Lancaster, Aug. 16, 1882.*

*Mr. James T. Fordley,*

*Please pay to M. B. Brown, or order, One Hundred Dollars, and charge to our account.*

$\$100 \frac{00}{100}$

*Jas. W. Andrews & Co.*

*Messrs. Alfred Slade & Co.*

*Gentlemen:—Please pay to Thomas Brown, or order, Thirty Dollars, due on my account, and oblige*

*Yours, respectfully,*

*Philadelphia, Aug. 12, 1882.*

*Robert H. Jenkins.*

## Orders for Goods.

*Baltimore, Feb. 19, 1882.*

*Mr. William B. Linden,*

*Please pay to Andrew B. Jones, or bearer, Sixty Dollars in Goods from your store, and place to account of*

*Henry W. Wilkins.*

*Albany, Mar. 25, 1882.*

*Mr. Charles Riqua,*

*Please send me, per bearer, Ten Barrels Flour, Genesee Extra, and oblige*

*Yours truly,*

*Henry Burnham.*

Dayton, O., August 16, 1882.

Messrs. L. A. Tiers & Son,  
New York.

Dear Sirs :

Please send immediately Five (5)  
Half-Chests Imperial Tea, Hugo & Otto, \$7, as per sample  
sent us, and oblige  
Yours, truly,

Corbin & Walworth.

St. Louis, Jan. 3, 1882.

Messrs. Eldredge & Brother,  
Philadelphia, Pa.

Gentlemen :—Please send us, per Union Line,

50 Chase and Stuart's Caesar's Commentaries.

50 do. do. Latin Grammar.

36 Brooks' Elocution.

50 Webb's Model Etymology.

50 Houston's Physical Geography.

24 Groesbeck's Book-Keeping (School Edition).

Upon receipt of your Bill, with Goods, we will remit as you  
may direct. Respectfully, yours,

Shorb & Boland.

## CHECKS.

A Check is a written order or request, addressed to a bank or banker, by a person having money deposited, requesting the payment, on presentment, of a certain sum of money to a person therein named, or to his order, or to the bearer.

When drawn payable to a person or bearer, it is transferable without indorsement, and the holder is entitled to payment; when drawn payable to a person or his order, it must be indorsed by the person to whom the check is made payable; when made payable to a person without the words "or order," or "bearer," or to a particular person "only," it is not negotiable.

An indorsement on a check payable either to "bearer" or "order" makes the indorser liable for its value.

As checks made payable to a person's order compel the payee to indorse them, they are, when drawn in this form, often used in lieu of receipts.

The drawer of a check may countermand its payment at any time previous to its payment or acceptance by the bank.

A check received from others should be presented without unnecessary delay, as the drawer will not otherwise be responsible for its payment in case of the failure of the bank.

Every holder of a check is liable to every subsequent holder only for the time for which he would be held if originally liable.

When the payee resides in the same city or town where the bank is located, the check should be presented for payment before the close of banking hours on the next day after it is received. If the holder lives at a distance, the check should be sent by mail the next day.

A check will not draw money from a bank after the death of the drawer; it is then only a good memorandum.

A post-dated check is payable on the day of its date; but, as circumstances may arise that will render void a check drawn with a date in the future, some prefer dating the check with the day on which it is drawn, and stating in the body of the check the day when it is to be paid.

When made payable on a future day mentioned, different from that of the date, they have been treated as bills of exchange, and as such are entitled to days of grace, the same as bills of exchange.


In New York, time drafts on banks or bankers are prohibited by law.

The amount of a check should always be written out in words. The amount in figures is placed in the corner, that the sum for which the check is drawn may be seen at a glance, and also as a precaution against any alteration which might be made.


The drawer of a check who leaves the amount to be inserted by another is responsible for whatever amount may be written.




## Check Payable to Bearer.

|   |   |                            |
|---|---|----------------------------|
|  | No. 7.  | Cincinnati, Aug. 16, 1882. |
|   | <b>First National Bank,</b>                         |                            |
|   | Pay to ..... Samuel Wallace, ..... or Bearer,       |                            |
|   | ~~~~~ Three Hundred ~~~~~ $\frac{50}{100}$ Dollars. |                            |
|   | $\$300\frac{50}{100}$                               | Hugh Graham.               |

## Check Payable on Order.


|   |   |                           |
|---|---|---------------------------|
|  | No. 127.  | Baltimore, Nov. 22, 1882. |
|   | <b>The National Bank of Baltimore,</b>                        |                           |
|   | Pay to ..... James J. Brown, ..... or Order,                  |                           |
|   | ~~~~~ One Hundred and Seventy ~~~~~ $\frac{88}{100}$ Dollars. |                           |
|   | $\$170\frac{88}{100}$   | Wm. F. Grant.             |

## Check Payable at a Future Time.

|  |  |                             |
|--|--|-----------------------------|
|  | No. 173.   | Kansas City, Mar. 13, 1882. |
|  | <b>National Park Bank,</b>                           |                             |
|  | Pay to ..... John F. Hope, ..... or Order,           |                             |
|  | ~~~~~ Eight Hundred ~~~~~ Dollars,                   |                             |
|  | on the 27th inst., without grace. Acceptance waived. |                             |
| $\$800$ .  | Robert H. Andrews.                                   |                             |



## Certified Checks.

A certified check is one for the payment of which the bank becomes responsible, upon being certified, or marked "good," by the paying teller, with his signature attached. Certified checks are used to prevent the inconvenience and risk of withdrawing and counting sums of money that are to be immediately paid to others. They are also used instead of drafts for making remittances to distant places

|   |                     |  |                         |
|---|---------------------|--|-------------------------|
|  | No. 122.            | Philadelphia, April 6, 1882.                 |                         |
|   | <b>Philadelphia</b> |  | <b>National Bank,</b>   |
|   | Pay to .....        | Hugh   | Graham, ..... or Order, |
|   | One                 |  | Thousand ..... Dollars. |
|   | \$1000.             | W. H. Wells, Teller.<br>M. E. Bradford & Co. |                         |

### Certificates of Deposit.

Certificates of Deposit are used when money is temporarily deposited, and no regular bank account is kept. When made payable to another person's order, they are frequently employed for making remittances, in the same manner as certified checks.

|   |   |           |
|---|---|-----------|
|  | \$5000.   | No. 1264. |
|   | <b>Boston National Bank.</b>  |           |
|   | Boston, Mass., Feb. 26, 1882.   |           |
|   |    |           |
|   | ..... Chas. H. Davis ..... has deposited in this<br>Bank ..... Five Thousand ..... Dollars<br>to the credit of ..... himself, ..... payable on return of<br>this Certificate properly indorsed. |           |
|   | James B. Elliot, Cashier.   |           |

### TRANSACTIONS WITH BANKS.

Banks are organized institutions for the employment of capital. Banks of "circulation and deposit" have the use, under certain restrictions, of the capital paid in by the stockholders, the money belonging to depositors, and the notes of their own circulation. The National Banks are required to deposit with the Treasurer of the United States interest-bearing bonds of the United States, in proportion to the capital stock paid in. All bonds so deposited are held exclusively as security for the circulating notes delivered to the banks depositing the bonds.

The following suggestions may be found useful to those who have dealings with banks :

To open an account with a bank, secure an introduction by satisfactory parties to the cashier or president.

Make your deposits in the bank as *early in the day as you conveniently can*, and never without your bank-book.

For your own security, it is well to have **ONE PARTICULAR PERSON** to do your business at the bank, who shall be competent to take charge of the money and papers you intrust to his care, and sufficiently intelligent to understand and properly deliver the messages and explanations you may have occasion to make ; also, that you write or stamp **OVER YOUR INDORSEMENT**, upon all checks which you send to be deposited to your credit in the bank, the words "**FOR DEPOSIT TO OUR CREDIT**," which will prevent their being used for any other purpose.

Always use the deposit tickets furnished by the bank, and examine the date and indorsement of every check. When checks are deposited, the banks require them to be indorsed by the depositor, whether drawn to his order or not.

Keep your check-book, when not in use, under your own lock and key. Make it a rule to give checks only out of **YOUR OWN CHECK-BOOK**.

Draw as few checks as possible. When you have several sums to pay, draw **ONE CHECK** for the whole, and take notes of such denominations as will enable you to distribute the amount among those you intend it for.

Do not allow your bank-book to run too long without being balanced, and when returned by the bank compare it with your own account, and examine your cancelled checks without delay. If you wish to preserve your cancelled checks, deface or destroy the signature as soon as returned, in a manner that will prevent their being copied, and place the checks out of the reach of others.

In filling up checks, do not leave space in which the amount may be increased. It has been decided that when a check is so carelessly drawn that an alteration may be easily made, the loss arising from the alteration, if any, must be borne by the drawer.

Write your signature with your usual freedom, and never vary the style of it.

Offer notes for discount or collection in good season. Do not put off the offering of notes for discount until the last day of your need. Send Notes and Bills for collection to the bank several days before they are due, that they may be properly entered, and the notices sent to the payers in time.

A **Clearing-House** is an association of banks, and their representatives meet at stated times to exchange documents and effect settlements between themselves. Each bank at the appointed time sends a statement of its debit and credit balances in which the others are interested, together with the vouchers. These are examined by the "settling clerk," the balances owed are paid in and received by the banks to whom they are due, and thus the settlement of transactions involving millions is concluded by the payment of a few thousand dollars, and in a very brief time.

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## COUNTERFEIT BANK-NOTES.

A **Counterfeit Note** is a *fac-simile* of the genuine, or as nearly like it as it can be made. A **Spurious Note** is made up of designs different from the genuine, and calculated to pass where the genuine is not known. An **Altered Note** is one altered from a lower to a higher denomination; or one on a broken or bogus bank, on which the name or locality is changed for that of a bank in good standing.

### Rules for Detecting Counterfeit Notes.

Examine the vignette or picture at the top of the note: see if the faces have a lifelike expression; if the eyes are well defined, showing the pupil distinctly, the white clearly; see if the drapery or dress fits well, looks natural and easy, and shows the folds distinctly—if the whole figure harmonizes. See if the sky is clear, or transparent, or soft and even, and not scratchy, and if the different objects have a finished appearance. In the genuine, small figures in the background are always exceedingly well executed.

Examine the medallion rulings and circular ornaments

around the figures, etc.; see if they are regular, smooth, and uniform. When there are two medallions on a bill designed to be alike, they are exactly alike, being from the same original die. This work is done by a geometrical lathe, a machine of great cost, and which produces fine and ornamental circles of such uniformity and exquisite perfection that it is almost an impossibility for the counterfeiter to produce a good imitation.

Examine the letters and figures; see if they are perfect in every respect,—all perfectly true and uniform and regular. In counterfeits the round handwriting is seldom well executed. Carefully study the hair-lines and curves, the shade or parallel ruling on the face or outside of the letters; see if they are without breaks or flaws, and have a finished, graceful appearance. Examine the engraver's signature or imprint; see if it is clearly and beautifully engraved; if the letters are all of one size and one slant; if the distances apart and the thickness of stroke are equal.

Examine the President's and Cashier's signatures. In some counterfeits the signatures are lithographed *fac-similes*, inked over with a pen, which gives them a stamped appearance, the stroke a dead color and a rough edge, and sometimes the pen does not follow the hair-stroke curve correctly; while the genuine signatures, which are written with a pen, have rather a glossy appearance, and the stroke a smooth edge.

Bank-notes altered by what is termed the "pasting process" may be detected by holding them to the light, when the parts pasted on will be discovered. When the alteration has been made by substituting figures or letters for others which have been extracted, the denomination in the centre of the note, when examined letter by letter, will be found to be poorly formed and blurred, and the parallel lines irregular and imperfect. The texture of the paper between the letters is very often destroyed,—a defect which may be discovered by comparing the paper between the letters with that immediately above and below; the ink of the altered part is also sometimes different from the rest of the note.

Avoid all hurry and confusion when taking money, as much of the bad money passed is passed under such circumstances.

**DESCRIPTION OF NATIONAL BANK-NOTES.**

**UNITED STATES** and title of bank on each of the different denominations.

**1s.**—Two females standing in front of an altar, one of them pointing upward. A large 1 on the left end, on which is, "Secured by Bonds," etc.

**Reverse Side.**—Landing of Pilgrims, in large oval; **ONE**, eagle in shield; **ONE**, on right; **ONE**, arms of the State; **ONE**, on left end.

**2s.**—Large 2, extending almost across length of note; United States, etc., on upper part, and 2 on lower part, on left end; female seated holding American flag, on which is a wreath.

**Reverse Side.**—Sir Walter Raleigh erect, smoking pipe; six men and a boy grouped around him at a table. 2, eagle and shield, on right; 2, arms of the State, on left end.

**5s.**—Columbus introducing America to Europe, Asia, and Africa,—the countries represented by female figures. Columbus discovering America; four men. 5 on right end, **FIVE** on left end.

**Reverse Side.**—Landing of Columbus and men. Spread eagle on right; arms of the State on left; **FIVE** and 5 on each end.

**10s.**—Female seated on spread eagle in clouds. Franklin drawing lightning from clouds with a kite; boy seated; 10 on right, **TEN** on left end.

**Reverse Side.**—De Soto on horseback, with his army, discovering the Mississippi. Spread eagle; arms of the State; 10, 10 on each side.

**20s.**—On right, allegorical representation of Loyalty; figure of Liberty in foreground, bearing national flag; farmers, artisans, etc., rallying around the flag. On left, battle of Lexington. 20 on each end.

**Reverse Side.**—Baptism of Pocahontas. Eagle and shield; arms of the State; 20 on the right, **XX** on left end.

**50s.**—Allegorical representation of Victory: three figures in a cloud; soldier kneeling. Washington and men in a boat crossing the Delaware. 50 on each end.

**Reverse Side.**—Embarkation of the Pilgrims. Eagle and shield; arms of the State; 50 and L on each side.

**100s.**—Female with wings, seated—allegorical representation—maintenance of Liberty and Nationality. Men in a row-boat in foreground, two vessels in background. 100, C, on right end; C, 100, on left end.

**Reverse Side.**—Signing Declaration of Independence. Eagle in an oval; arms of the State; 100 on right, C on left side.



## DUE-BILLS.

A Due-Bill is a simple acknowledgment of a debt, in writing. It is not payable to order, nor is it assignable by mere indorsement. *Bowyer Law Dictionary*. It is subject to all the offsets and equitable rights between the original parties, and action must be brought in the name of the original obligee. Due-bills do not draw interest unless specified.

### Due-Bill for Money.

\$125.

*Philadelphia, July 10, 1882.*

*Due Henry W. Chase, for value received, One Hundred and Twenty-Five Dollars, with interest.*

### Due-Bill for Goods.

*Due, New York, August 9th, 1882, to H. Y. Bennett, for value received, Sixty-Five  $\frac{50}{100}$  Dollars, in goods from my store.*

\$65  $\frac{50}{100}$

*Geo. W. Hanson.*



## PRODUCE NOTES.

A Produce Note is a written engagement to deliver specific articles to a specified amount. Like due-bills, produce notes are not assignable by mere indorsement. The maker of the note must be able to prove that he was ready at the proper time and place, and continued ready, to deliver the articles, or he may be compelled to pay their value in money.

## Produce Note.

\$37 <sup>25</sup>/<sub>100</sub>.

Lebanon, July 2, 1882.

*For value received, we promise to pay to Chas. R. Hills, on demand, Thirty-Seven <sup>25</sup>/<sub>100</sub> Dollars, in goods at our store.*

---

*R. B. Painter & Co.*

## Form of Assignment of a Produce Note.

(To be indorsed on the back of the Note.)

*For value received, I assign the within Note to A. J. Gordon, without (or with) recourse, this 17th day of July, 1882.*

*Clarence A. Ebert.*



## PROMISSORY NOTES.

A Promissory Note is a written promise to pay, unconditionally and at all events, a specified sum of money. Promissory notes are either *negotiable* or *non-negotiable*.

A note is negotiable when the promise is made not only to the person named in it, but to his *order* or *bearer*, and may be transferred to another, and its full face value collected by him, irrespective of any subsequent dealings between the original parties.

If a note be made payable to Jas. Graham, or *bearer*, it may be collected by Jas. Graham, or by any one who may hold or bear it, and is negotiable by mere *delivery*.

## Form of Note Payable to Bearer.

\$500.

Portland, July 3, 1882.

*Three months after date, I promise to pay to James Graham, or bearer, Five Hundred Dollars. Value received.*

*Chas. J. Raymond.*

A note made payable to James Graham, or *order*, may be collected by any one to whom James Graham may order it to be paid. The order is commonly written upon the back of the note, and is called an indorsement. If James Graham simply wrote his name on the back of the note, it would be an indorsement in blank, and is equivalent to "Pay to bearer," and would then be negotiable by delivery. (See *Indorsements*.)



## Note Payable to a Person, or Order.

\$1000.

Troy, June 29, 1882.

*Thirty days after date, for value received, we promise to pay to James Graham, or order, One Thousand Dollars.*

*J. R. Flannigan & Co.*

A note made payable to James Graham, or James Graham only, is not negotiable, and is payable only to the party named.

## Non-Negotiable Note.

\$300.

Worcester, June 10, 1882.

*Sixty days after date, I promise to pay to James Graham Three Hundred Dollars. Value received.*

*Henry J. Gordon.*

A custom prevails in the mercantile community of drawing notes payable to the maker's own order, with his indorsement, for the purpose of facilitating their transfer without requiring the holder to indorse them.

## Note to One's Own Order.

\$1800.

Pittsburgh, September 20, 1882.

*Four months after date, I promise to pay to the order of myself, Eighteen Hundred Dollars, without defalcation. Value received.*

*Philip T. Wharton.*

In Pennsylvania, the words "*without defalcation*" must be inserted in the note in order to render it negotiable.

The words "*value received*" are not necessary to render the note negotiable, but they imply a consideration, which is necessary to make a promise binding on the maker of it.

The person who promises to pay is called the *promisor*, *maker*, or *drawer*; the person to whom the note is made payable is called the *payee*; the person who writes his name upon the back of the note is called the *indorser*; and the person to whom it is transferred by indorsement is called the *indorsee*.

*All the parties who have written their names on a note are liable for the amount due, but only one satisfaction can be recovered.*

A note given on Sunday is void, but the original consideration will hold. A note founded upon fraud, or when the consideration is illegal, is also void. Any material alteration in a note—as, for instance, in the date, or amount, or time of payment—discharges all parties who have not consented to such alteration.

The date of the note is not held to be the date when written, but the period fixed from which to count the time which the note is to run.

If a person at the time of taking a note has notice that it is void through fraud or upon any legal grounds, he places himself in the position of the payee. A note as a gift is void, from want of consideration, unless in the hands of a third party.

Notes made payable at a fixed time are allowed, in most of the States, three days after the expiration of the time expressed for payment. These three days are called “days of grace.”

Demand for payment must be made upon the last day of grace ; or, if that falls on Sunday, or on a leading holiday, such as the Fourth of July, Thanksgiving, Christmas, New Year, and, in Pennsylvania, Washington’s Birthday, demand must be made on the day preceding. In New York, Decoration Day and election day in November are also legal holidays.

No days of grace are allowed in California, and in Alabama, Georgia, and Kentucky, since 1879, except when the note is held by a bank or private banker.

If a note is given by a person who cannot write, it is important to have a witness who can testify to the genuineness of his mark.

Promissory notes do not bear interest until after maturity unless so specified.

If a note is paid before due, and afterwards comes into the hands of a *bona fide* holder for value, he can still claim full payment from the maker at maturity.

A note after it is dishonored or over-due is not negotiable, but subject to all the equities which the maker may have against the original payee ; and no more can be collected than the original payee could have recovered.

A note given by a minor is voidable at the election of the

minor ; and, until ratified by him after his arrival at full age, it is of no effect.

If no time is fixed for payment in the note, it is payable upon demand ; if payable to a fictitious person, it is payable to bearer.

If a promissory note, or bill of exchange, has been lost or destroyed, payment must be demanded and notice given as if the note was still in possession.

The amount of a negotiable or non-negotiable bill or note which has been destroyed by fire or other accident, may be recovered upon sufficient proof.

Payment of a non-negotiable note which has been lost may be enforced ; but if a note or bill negotiable and transferable is lost, it is held in some States that a suit at law may be maintained against the maker ; in others that it cannot ; and, again, in others, that the holder may recover upon sufficient security and indemnity being given.

The amount of a note should always be written out in words ; it is usually written in both words and figures. When the sum in figures differs from that expressed in words, the latter is taken as the amount of the note.

**Presentation for Payment.**—The presentation of a bill of exchange or promissory note should be made on the day of its maturity,—that is, on the last day of grace,—and *not before*, and must be made personally, either by the holder or his authorized agent, and cannot be made by a written demand sent to him through the post-office.

**What is Necessary to Hold an Indorser.**—In order to charge an *indorser*, if the bill or note is payable at a particular place, a bank for instance, it must be presented there for payment on the very day it becomes due ; if no place is mentioned, the demand must be made at the maker's place of business during business hours, or at his dwelling-house within reasonable hours. If the note is given by joint makers, it must be presented to them all. In case of the death of the maker, it should be made to the executor or administrator, if they have been appointed ; if not, at the dwelling-house of the deceased. When the maker has absconded, no presentation is necessary.

It has been decided that the maker of a note cannot be held for the cost of protest.

It is not necessary, to fix the liability of the *maker* of a note, that there should be demand, protest, or notice; but *notice of non-payment*, either verbal or written, but well authenticated, *to the indorser, is necessary to hold him liable*. The notice should be given on the same day on which the note falls due, or the next day thereafter, if the parties live in the same town; if not, by the first mail; otherwise the indorser will be discharged.

The notice should state that the bill or note was duly presented, and that payment was refused, and should contain a correct description of the note, so that there can be no mistake in regard to its identity; it should also contain a declaration that the person to whom the notice is sent will be looked to for payment and indemnity. (*See Notice, page 348.*)

It is advisable, when a note which is indorsed is not paid by three o'clock on the day of its maturity, to place it in the hands of a notary for protest, as the protest is evidence that the note was properly presented for payment and that payment was refused. The notary will send the notices required.

**A Notary, or Notary Public**, is an officer authorized by law, whose business it is to attest documents or writings of any kind to give them the evidence of authenticity.

**A Protest** of a promissory note or bill of exchange is a formal declaration made by a Notary Public under hand and seal, at the request, of the holder of a bill or note, for non-acceptance or non-payment. This declaration is a protest to the drawer and all other parties to the bill against any loss which may be sustained by the payee or holder. (*See Bills of Exchange.*)

**An Accommodation Note** is one for which the maker receives no consideration, but which he makes for the purpose of lending his credit to the payee to enable him to raise money. The party for whom such an accommodation was made cannot recover from the maker; but if it is indorsed for value to a third person, although he may have notice that it is an accommodation note, and no consideration was given for it, that *third person* can nevertheless recover from the original maker.

An accommodation note is drawn in the ordinary negotiable form, and is either made payable to the party accommodated, or passed by the payee to the credit of the drawer.

**A Collateral Note** is one given with stocks or other property as security, empowering the payee to sell if the note should not be paid when it becomes due.

**A Joint Note** is one which is written thus, "We promise to pay," etc., signed by two or more persons, or written, "We promise to pay," and signed "A. B., principal, H. T., security." The words *principal* and *security* only show the relation of the makers to each other; they do not affect other parties.

When a note is written, "We jointly and severally promise," or, "I promise," etc., and signed by two or more persons, it is a **Joint and Several Note**.

The promisors of a joint note must be sued jointly, while either promisor of a joint and several note may be sued alone.

A release of the maker, or of one joint maker, by the holder, is a discharge of all the indorsers.

If a seal is added to a promissory note, it is not debarred or cut off by the Statute of Limitations, but it then becomes non-negotiable, and can be transferred only by assignment.

**A Judgment Note** differs from a common promissory note in having a seal appended, with a power of attorney to confess judgment.

The maker, by this power of attorney, authorizes the payee to have judgment entered, which is a lien against his lands or estate, and authorizes the issuing of an execution without resort to a suit by the ordinary course of law.



An agent is personally liable on the contract he makes, if he makes himself so expressly, or transcends his authority. (*See Agency.*)

If an agent exceeds his authority in signing the name of his principal to a note, the note will be void as to the principal, even in the hands of a *bona fide* holder. A general authority to transact business, even if it is expressed in words of very wide meaning, will not be held to include the power of making the principal a party to negotiable paper.

## Forms of Negotiable Notes.

\$600.*New York, July 17, 1882.*

*Three months after date, I promise to pay to George H. Morehead, or order, at the Metropolitan National Bank, Six Hundred Dollars. Value received. Samuel H. Stewart.*

\$675.*Philadelphia, August 8, 1882.*

*Sixty days after date, we promise to pay to Edmund A. Souder, or order, Six Hundred and Seventy-Five Dollars, without defalcation. Value received. L. H. Burton & Co.*

## Note Bearing Specified Rate of Interest.

\$290.*Palaska, Fla., August 16, 1882.*

*Six months after date, I promise to pay Charles Riqua & Co., or order, Two Hundred and Ninety Dollars, with interest at Ten per cent. per annum. Value received.*

*John L. Brown.*

## Non-Negotiable Note.

*Harvard, Ill., April 9, 1882.*

*Thirty days after date, I promise to pay to A. D. Groesbeck One Thousand Dollars. Value received.*

\$1000.*Charles J. Fisher.*

## Note without Days of Grace.

\$250<sup>75</sup>/<sub>100</sub>.*New Orleans, April 4, 1882.*

*Ten days after date, without grace, I promise to pay to Samuel G. Milburn, or order, Two Hundred and Fifty <sup>75</sup>/<sub>100</sub> Dollars. Value received. Philip S. Chester.*

## A Joint Note.

*Montgomery, August 11, 1882.*

*Three months after date, we jointly promise to pay to Walter L. Vaughan, or order, Three Hundred and Fifty Dollars. Value received.*

*William H. Tracy,  
Darwin L. Hunter.*

\$350.

## A Joint and Several Note.

*Montpelier, October 11, 1882.*

*Sixty days after date, we jointly and severally promise to pay to the order of John B. Felshaw Seven Hundred and Thirty  $\frac{59}{100}$  Dollars, without defalcation. Value received.*

\$730  $\frac{59}{100}$ .

*Henry A. Tyson,  
James C. English.*

## One Form of Accommodation Note.

\$500.

*Lancaster, March 13, 1882.*

*Sixty days after date, I promise to pay to the order of John D. Laverty Five Hundred Dollars, at the Lancaster National Bank, without defalcation. Value received.*

*Credit the drawer,  
John D. Laverty. }*

*S. F. Powell.*

## Judgment Note.

*Sixty days after date, I promise to pay to Augustus H. Robinson, of Buffalo, or order, One Thousand Dollars, with interest, for value received.*

AND FURTHER, *I do hereby authorize any attorney of any Court of Record in Pennsylvania, or elsewhere, to appear for me, at any time after the above note becomes due and remains unpaid, and after declaration filed thereupon, to confess judgment against me for the above sum, with costs of suit, release of errors, etc.*

WITNESS *my hand and seal, at Cincinnati, this 17th day of August, in the year one thousand eight hundred and eighty-two.*

*Signed, sealed, and delivered  
in the presence of*

*Orlando Barnes,  
Henry F. Foster.*

*Joel F. Harrison. [SEAL.]*

## A Note Payable by Instalments.

\$1200.


*Baltimore, September 10, 1882.*

*For value received, I promise to pay to Charles M. Williamson, or order, Twelve Hundred Dollars, with interest, in*

*the manner following, viz., Two Hundred Dollars two months after date, and the balance in instalments of Two Hundred Dollars each, payable every two months thereafter, until the whole amount shall be paid.*

*James L. Bennett.*

**Form of Note used by many Wholesale Houses.**

|   |  |   |
|---|--|---|
|  | <p><i>\$150.</i></p>   | <p><i>Philadelphia, May 19, 1882.</i></p> |
|   | <p><i>Four months after date, I, the subscriber, residing in Massillon, Stark Co., State of Ohio, promise to pay to the order of Young, Moore &amp; Co. One Hundred and Fifty Dollars, for value received, negotiable and payable without defalcation or discount, and without relief from any valuation or appraisement law, with current rate of exchange on Philadelphia, Pa.</i></p> |   |
|   | <p><i>No. 89. Due Sept. 19 22.</i></p>   |   |
|   | <p><i>Jas. A. Jackson.</i></p>   |   |

**Indiana Partnership Note.**

|  |  |  |
|--|--|--|
| <p><b>JAS. J. HUMES.</b></p> <p><b>CHAS. J. LINN.</b></p>                              | <p><i>\$100<sup>75</sup>/<sub>100</sub>.</i></p>   | <p><i>Indianapolis, June 16, 1882.</i></p> |
|  | <p><i>Four months after date, we, the subscribers, of Blue River, county of Johnson, State of Indiana, promise to pay to the order of Hunter, Simons &amp; Co.</i></p> |  |
|  | <p><i>(without any relief whatever from appraisement or valuation laws, with the current rate of exchange)</i></p>   |  |
|  | <p><i>One Hundred <sup>75</sup>/<sub>100</sub> Dollars, without defalcation, for value received, payable and negotiable at the State Bank of Indiana.</i></p>          |  |
| <p><i>Samuel Hunter,</i></p> <p><i>Alfred Simons,</i></p> <p><i>William Smith.</i></p> |  | <p><i>Humes &amp; Linn.</i></p>            |



## Collateral Note.

\$500. Philadelphia, July 12, 1852.

Sixty days after date, I promise to pay to the order of Henry H. Ashmead, Five Hundred Dollars, without defalcation, for value received.

Having deposited United States  $4\frac{1}{2}\%$  Bonds of the nominal value of Six Hundred Dollars, .....

which I authorize the holder of this Note, upon the non-performance of this promise at maturity, to sell either at the Broker's Board or at public or private sale, without demanding payment of this Note or the debt due thereon, and without further notice, and apply proceeds, or as much thereof as may be necessary, to the payment of this Note and all necessary expenses and charges, holding *MEXIA* responsible for any deficiency.

Payable at .....  
Due Sept. 10 1853, .....

Marion H. Heath.

## Form of Protest and Notice.

## United States of America.

It is Known, That on the day of the date hereof, at the request of HENRY L. DAWSON, of Philadelphia, the holder of the original note of which a true copy is hereunto annexed, I, the undersigned, Notary Public for the Commonwealth of Pennsylvania, by lawful authority duly commissioned and sworn, residing in the city of Philadelphia, presented the same, during the usual hours of business for such purposes, at the place of business of the maker, to a proper person there duly acting and attending, and competent to give answers, and demanded payment thereof, which was refused, and answer was made that the maker of the note was not within, and that there were no funds provided there for its payment.

Whereupon I, the said Notary, at the request aforesaid, have Protested, and do hereby solemnly Protest, against all persons and every party concerned therein, whether as Maker, Drawer, Drawee, Acceptor, Payer, Indorser, Guarantee, Surety, or otherwise howsoever against whom it is proper to protest; for all Exchange, Re-exchange, Costs, Damages, and Interest, suffered and to be suffered for want of payment thereof:—Of which demand and refusal I duly notified WOODWARD & WARNER, the indorsers thereof.

Thus done and Protested, at Philadelphia aforesaid, the nineteenth day of January, 1882.

[SEAL.]

HARRISON M. BOYD,  
*Notary Public.*

## Notice to Indorser.

PHILADELPHIA, Jan. 19, 1882.

Payment of a Promissory Note drawn by RICHARD S. WILTON in favor of yourselves, and by you indorsed, dated Nov. 16, 1881, for Five Hundred Dollars, delivered to me for Protest by HENRY L. DAWSON, the holder, being this day due, demanded, and refused, you will be looked to for payment, of which you hereby have Notice.

HARRISON M. BOYD,  
*Notary Public.*

To Messrs. WOODWARD & WARNER.

## DRAFTS AND BILLS OF EXCHANGE.

A **Draft or Bill of Exchange** is an order, or open letter of request, for a sum of money, addressed to a person in a distant place.

A **Bill of Exchange** must be for the payment of *money*, and also payable absolutely at all events, and must not depend upon any uncertainty or contingency.

When the order is addressed to a person residing in a foreign state or country, it is called a *Foreign Bill of Exchange*.

When addressed to a person residing in the same State or country as the drawer, it is called a *Draft*, or an *Inland or Domestic Bill of Exchange*.

The different States of the United States, in law, are foreign to each other; so that a bill drawn in Pennsylvania upon a person in Illinois is considered a foreign bill.

There are, however, no essential differences between foreign and inland bills, except that the rights of proceeding and remedies thereon are governed by different rules and regulations in different countries; and in the case of foreign bills, when acceptance or payment is refused, a *protest is indispensably necessary*. This instrument is admitted in foreign countries as a legal proof of the refusal.

A protest is not absolutely required to entitle the holder of an *inland bill* to recover from the drawer or indorser when acceptance or payment has been refused. *Due notice*, however, must be given of the non-acceptance or non-payment.

Drafts, or bills of exchange, are used for safety in making remittances. They are drawn payable to the order of the person to whom sent, and are, therefore, not to be paid until indorsed by him.

Their use avoids the expense and trouble of sending coin or currency, and as they are left in the hands of the person making the payments, they thus become vouchers to prove that the money has been properly paid.

Bills of Exchange may be made payable at sight, that is, on presentation; or a certain time after sight, or on demand, or a certain time after date.

They are sometimes drawn at *usage*, which is the usual time allowed by custom or law in the place where they are made payable, and varies from *fourteen days* to *three months*. The *usage* of England is *sixty days after sight*, with three days of grace ; of France, *thirty days*.

If made payable in so many days *after sight*, or *demand*, they should be presented for acceptance, in order to fix the period of payment ; but if the bill is payable *on demand* or at *sight*, or a certain number of days *after date*, it need not be presented merely for acceptance, but only for payment. It is usual, however, and advisable, to present all bills except those drawn payable at sight, or on demand, for acceptance.

In the following States and Territories, days of grace on sight drafts are allowed either by custom or by special enactment :

Alabama, Arkansas, Dakota, Indiana, Iowa, Kentucky, Maine, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, New Jersey, North Carolina, Oregon, Rhode Island, South Carolina, Texas, Utah, Wisconsin, and Wyoming.

If the bill contains the words "*as per advice*," the drawee may wait for further directions or advice ; and if he accepts or pays without doing so, he does it at his own peril.

Bills of Exchange are usually collected through the medium of banks or bankers, and, when desired for the purpose of making remittances, may be purchased from them, generally, at a small premium or discount on the amount of the bill.


The person who writes or draws the bill is called the *drawer*. The person to whom it is addressed is called the *drawee*. The person to whom payment is made is called the *payee*. If the *drawee* agrees to pay the money signified in the bill, he does it by writing his name across the *face* of the bill, and is then said to *accept* it, and is called the *acceptor*. If the person to whom the bill is made payable assigns it to another person, he does it by writing his name upon the *back* of the bill, and is then called the *indorser*.

Accepting a bill binds the acceptor the same as signing a note of the same tenor. Every indorser, as well as the acceptor, is security for the bill, and if protested for non-acceptance or


non-payment, they and the drawer are liable to the holder for the principal sum, the interest, and the expense incurred by the dishonor,—such as cost of protest, broker's commission, and rate of exchange. Most of the States of the Union have provided by statute a certain fixed sum or percentage in lieu of damages and re-exchange. The parties to a bill are liable to the holder according to the law of the place where they entered into their respective contracts; the drawer, according to the law of the place where the bill is drawn; the acceptor, according to the law of the place of acceptance; and the indorsers, of the place where the indorsements were made.

When a person draws a bill of exchange, he subjects himself to the payment of it should the person on whom it is drawn refuse either to accept or pay, if the holder of the bill gives him due notice.

#### A Draft or Inland Bill of Exchange.

|   |                                   |  |                                |
|---|-----------------------------------|--|--------------------------------|
|  | No. 37.                           | \$1000 <sup>00</sup> / <sub>100</sub> .  | Rochester, Nov. 24, 1882.      |
|   |                                   |  | At Ten Days' Sight, Pay to the |
|   |                                   | Order of.....                            | Charles McClinton.....         |
|   |                                   | ~~~~~                                    | One Thousand Dollars,~~~~~     |
|   |                                   | Value received, and charge to Account of |                                |
|   | To Duncan & Sherman,<br>New York. |  | J. L. Stewart.                 |

#### Accepted Draft.

|   |  |   |
|---|--|---|
|  | \$250 <sup>75</sup> / <sub>100</sub> .       | Dover, Dec. 3, 1882.  |
|   |  | Ten Days after Sight, Pay to the                                    |
|   | Order of.....                                | Thomas W. Moore.....  |
|   | ~~~~~  | Two Hundred and Fifty ~~~~~ <sup>75</sup> / <sub>100</sub> Dollars, |
|   | Value received, which place                  | to Account of   |
|   | To R. R. Robinson & Co.,<br>Wilmington, Del. | James Merrill.  |

Drafts are sometimes accepted in the following form. "Accepted Apr. 4, 1882, payable at the City National Bank, Charles Ennis."

## First of a Set of Exchange on Liverpool.

Exchange for £1000.

Boston, Apr. 30, 1882.



At Sixty Days' Sight of this **FIRST** of Exchange (Second & Third of same tenor and date unpaid)

Pay to the Order of ..... *Peter Walker* .....

~~~~~ *One Thousand Pounds Sterling* ~~~~~

for Value received, and place the same to account of



To Brown, Shipley & Co.,  
Liverpool, England.

1

George Peabody.

## Second of a Set of Exchange on Paris.

Exchange for 10,200 Fr.

New York, Nov. 14, 1882.



At Sixty Days' Sight of this **SECOND** of Exchange (First & Third of same tenor and date unpaid)

Pay to the Order of ..... *Joseph Wilson* .....

~~~~~ *Ten Thousand Two Hundred Francs* ~~~~~

for Value received, and place the same to account of



To Delacroix & Co.,  
Paris.

2

Duncan &amp; Co.

## Third of a Set of Exchange on Frankfort.

Exchange for 5000 Florins.

Phila., Apr. 4, 1882.



At Sixty Days' Sight of this **THIRD** of Exchange (First & Second of same tenor and date unpaid)

Pay to the Order of ..... *J. Albert Garland* .....

~~~~~ *Five Thousand Florins* ~~~~~

for Value received, and place the same to account of



To Grants, Balfour & Co.,  
Frankfort.

3

Drexel &amp; Co.

If acceptance is refused, or if payment is not made on the day when the bill becomes due, notice should be given, *without delay*, to each party liable, that they may be held.

The holder should give notice to the other parties to the bill, if the acceptance is in part, or qualified, or not in full, if he intends having recourse to them in case of non-payment when due.

The acceptor, who is the party originally held bound, may be allowed whatever indulgence or delay the holder pleases, short of the time allowed by the statute of limitations.

A Draft or Bill, as between a debtor and creditor, fixes the amount to be paid, so that it cannot be disputed, and also appoints a definite day for the payment.

#### FOREIGN BILLS OF EXCHANGE.

Foreign Bills of Exchange are usually drawn in Sets, called the First, Second, and Third, etc., of Exchange, all of the same tenor and date, and so worded that when one is paid the others are rendered void. They are sent by different mails or conveyances, as a precaution against loss or inconvenience arising from accident or miscarriage. *Solu* is the name given to a single bill.



#### LETTERS OF CREDIT.

A Letter of Credit is a letter drawn by a banker, and addressed to one or more bankers in other countries, requesting that the bearer be paid any sum of money required by him not exceeding that specified in the letter.

Letters of Credit are preferred to Bills of Exchange by travellers, because the money need not be all drawn at one place and at a certain fixed date, but at any of the places mentioned, at any time, and in such sums as may be required. This obviates the necessity of carrying a large amount of cash about the person or in one's baggage, which is always dangerous.

They can be procured from foreign exchange bankers either by depositing the amount in money or in securities. When funds are desired, the holder of the letter of credit presents it

to one of the bankers in the list, or any other banker who is willing to respond, and either signs a draft or a receipt for the money. His signature must correspond with that on the letter of credit. The current rate of exchange and a small commission is charged. The amount drawn is written on the back of the letter of credit, and on the traveller's return an account is made out by the banker who issued the letter, in which interest is included, and the balance of the money deposited by the traveller, if any, is returned to him.

#### FORM OF LETTER OF CREDIT.

##### Manderson & Rathburn's Letter of Credit.

No. P. 24476.

*Philadelphia, July 28, 1882.*

Gentlemen:—We hereby authorize the bearer, *Mr. John L. Carey*, to value at short or other usance upon Messrs. Hodgson & Bernard, of London, to an aggregate amount of £500 (*Five Hundred Pounds*).

We crave reference to the signature of *Mr. John L. Carey*, at foot, and would request you to negotiate any drafts drawn in compliance with the terms of this credit, which drafts we engage shall have due honor, if drawn before Dec. 31, 1882, and their issue is indorsed hereon.

Your charges are of course to be paid by the accredited party. Asking for *Mr. John L. Carey* your usual courtesies,

We are, gentlemen,

Your most obedient servants,

*Manderson & Rathburn.*

The signature of

*Jno. L. Carey.*

TO MESSIEURS THE BANKERS mentioned on the third page of this Letter of Credit.

Circular Notes are also issued by some bankers, payable to the order of the person buying them, in sums of £5 and £10 sterling each, or the equivalent, according to the currency of the country where presented. These notes are accompanied by a letter of identification from the banker issuing them,



which is to be countersigned by the bearer on the presentation of the notes. Other notes are also issued, which, instead of being indorsed upon presentation by the person to whose order they are drawn, the holders are required to indorse with a certain word of identification that has been given, so that in case of loss none but the party possessing the word will be able to realize upon them.



## INDORSEMENTS, ACCEPTANCES, ETC.

### INDORSEMENTS.

The word indorsement signifies a writing on the back of a bill or written instrument; but it is well settled this is not essential in order to charge a person as an indorser. The indorsement may be on any part of the note, or on a paper annexed to it, and in ink or pencil; but it is better that the signature should be in ink, to prevent erasure.

When a note or bill is drawn payable to a person or his order, it is properly transferable only by indorsement; nothing else, in law, will hold the parties to a note directly liable to the holder.

### Forms of Indorsements.

1. Indorsement in Blank.

*John S. Barton.*

2. Indorsement in Full.

*Pay to Jas. Jones, or order.*  
*John S. Barton.*

3. Qualified Indorsement.

*Without recourse.*  
*John S. Barton.*

4. Restrictive Indorsements.

*Pay Robert Hunter for my use.*  
*John S. Barton.*  
*Pay to Chas. Harrison only.*  
*John S. Barton.*

5. Conditional Indorsement.

*Pay George Gray, or order,*  
*the within, unless before due he*  
*receives the amount from my*  
*agent.* *John S. Barton.*

6. Indorsement by an Agent.

*John S. Barton,*  
*Agent for Howard Chester.*

7. A Guarantee on a Note.

*For value received in cash, I*  
*hereby guarantee the payment of*  
*the within Note.*  
*John S. Barton.*

1. A blank indorsement makes a note transferable by mere delivery only, and by it the indorser is made liable for the payment of the note. If the note or bill is lost after such blank

indorsement, any person who should become the holder of it, in good faith, for a valuable consideration, without notice, would be entitled to receive the amount thereof.

2. Indorsements in full prevent a subsequent *holder* from recovering against the antecedent parties, unless he can deduce a regular title to the bill from the person whose name stands as first indorser.

If all the subsequent indorsers are in blank, the holder may make himself the immediate indorsee of any one of them, or he may deduce his title through them all in succession.

If some of the subsequent indorsements are in full and some in blank, then he must make a regular deduction of title through them all, or make himself the immediate indorsee, under some prior blank indorsement.

Persons taking a bill or note subsequently to a blank indorsement may transfer it, either by delivery or by indorsement.

3. A qualified indorsement is one which affects the liability of the indorser, but not the negotiability of the note. If the holder of a note wishes to transfer it without being held liable for its payment, he can do so by writing "*without recourse*," or other words to that effect, before his signature.

4. The holder who has absolute property in a bill or note has the power of limiting payment to whom he pleases. A restrictive indorsement will not, however, be presumed from equivocal language, as restrictive indorsements tend to impair the negotiability of bills and notes.

5. If the payee or indorsee of a bill or note annexes a condition to his indorsement *before acceptance*, the drawee who afterwards accepts it is bound by the condition. If the terms of the condition are not complied with, the property in the bill reverts to the payee, and he may recover the sum payable in an action against the acceptor.

6. An agent should expressly indorse as agent, or write the name of his principal; otherwise the indorsement would be inoperative. When an agent is compelled to indorse notes or bills over to his principal, to avoid responsibility, he should use a restrictive form of indorsement.

In Pennsylvania, a factor who remits a bill to his principal,

in payment of goods sold on his account, and indorses the bill, does not thereby become *personally responsible to his principal*, if he receives no consideration for guaranteeing, and does not expressly undertake to do so. 4 *Rawle*, 384-389; 5 *Whart.*, 288.

An indorsement in the form of *A. B., Treasurer of — Company*, has been held not to render the agent liable as an indorser, but considered as intended only to pass the paper, and as equivalent to an indorsement "without recourse."

7. An indorsement implies a contract to pay the note if dishonored, if due notice is given of dishonor, and not otherwise; whereas a *guarantee* implies a contract, if due notice is given of dishonor *within a reasonable time*.

The guarantee should contain words importing consideration, and, *unless made expressly negotiable*, is good only to him who first takes the note and advances money upon it. If the guarantee is upon a separate paper, it should describe the note with sufficient distinctness.

If, upon proper presentation, payment of a note or bill is refused, the holder must give prompt notice of such refusal to each indorser whom he wishes to hold for payment, and inform him that he will be held for the payment of the same; otherwise the indorser will be discharged. If the holder could delay, he might injuriously affect the indorser, and his remedy against other persons.

Under a decision of the Supreme Court, no liability is attached to one who indorses a note prior to its being indorsed by the payee.

The holder of a note or bill may commence suit against any of the indorsers, or against all of them at once.

When there are several indorsers, each is liable to those after him, and should give notice to all parties indorsing prior to himself.

Each indorser may require any one whose name precedes his own to make good to him the loss he may sustain, provided he gives notice of his intention to do so on the day he receives his own notice, or the day after.

This notice may be given by any person competent to serve it; but a notary public is usually employed for the purpose.

## ACCEPTANCES.

An Acceptance is an engagement to comply in whole or in part with the terms of a bill. When the drawee engages to pay according to its terms, it is called a *general acceptance*; when he agrees to pay with some qualification or condition different from the bill, it is called a *conditional* or *qualified acceptance*.

When a bill is presented for acceptance, the drawee is entitled to twenty-four hours, if he desires it, to decide whether he will accept it or not. In New York and Missouri, if the bill is not returned within twenty-four hours, it is deemed by law to be accepted.

Acceptances are usually written across the face of the bill, and, for distinctness, in red ink.

Any words not refusing its request, or the signature of the acceptor in blank, is *prima facie* evidence of acceptance; and when not otherwise provided for by law, the acceptance may be either verbal or in writing,—a written acceptance, of course, being more easily susceptible of proof.

In New York it is held that no person shall be charged as an acceptor of a bill of exchange unless the acceptance be in writing, and every holder may, on presentation of the bill, require that the acceptance be written on the bill, and if such acceptance is refused, the bill may be protested for non-acceptance.

The holder may assent to a qualified acceptance, and it will be good as far as it extends; but he takes it at his own risk, and he must give notice to the antecedent parties, or they will not otherwise be held bound by it. The condition of the acceptance should appear upon the face of the acceptance in writing, as any subsequent holder for value, without notice, would not be bound by verbal conditions.

The holder is not bound to take any but an unqualified or unconditional acceptance; and when refused, if he wishes to maintain a claim against the other parties, he should treat the bill as dishonored, unless they assent to the proposed conditional acceptance. If the holder declines the conditional acceptance, it will be a waiver of all right to hold the drawee.

**Form of Conditional Acceptance written across  
the Face of a Draft.**

*"Accepted if in funds from consignment shipped us on 3d instant.  
Roger B. Gray.*

*"New York, Oct. 17/82."*



**AGENCY.**

**An Agent** is a person having power to act for another, who is called a principal.

A man may do by his agent whatever he can lawfully do himself, and his agent can do for him.

**A General Agent** is one appointed to transact all the business of his principal, or all his business of a particular kind.

**A Special Agent** is appointed for a specific and particular purpose.

**A Broker** is an agent employed to negotiate between other parties, and is presumed to act in the name of his principal.

**A Factor** or **Commission Merchant** is an agent to sell goods for his principal, but who acts for several persons in that capacity. He differs from the broker in having actual possession of the goods. A Factor may buy and sell in his own name as well as in the name of his principal.

**An Attorney** is an agent acting in behalf of his client.

The authority of an agent may be constituted in three ways: by deed under seal, by a writing without seal, or by mere words.

The authority of an agent may be revocable or irrevocable. It is irrevocable when an interest in the subject-matter is conveyed to the agent, or the authority is given for a valuable consideration; it is revocable when no interest is conveyed, in which case the principal can revoke the authority at his pleasure, subject in some cases to a claim for damages.

An agency may be revoked by the operation of law, by expiration of time, by changes producing incapacity to act, by the extinction of the subject-matter or its complete fulfilment, or by the death of the principal. A power of attorney to sell

goods or stocks ceases with the life of the principal, and upon his death may become valueless.

Where the conveyance or any act is required to be under seal, the authority to execute it must be under seal also.

Verbal authority, ordinarily, is sufficient; but an agent ought, for his own security, to act under written authority, and to disclose his character whenever he executes a contract. In signing his name, the mere use of the word "agent" is not sufficient; the name of the principal must also appear. Instead of writing, "Henry Grant, Agent," it should be, "R. Brown, per Henry Grant;" or, "R. Brown, by his attorney, Henry Grant."

If an agent does an act or makes a contract unauthorized by his principal, though in the name of the principal, he is personally liable; but if the principal, with the knowledge of all the facts, adopts or acquiesces in the acts done under an assumed agency, he cannot afterwards impeach them under the pretence that they were done without authority, or even contrary to instructions. If the principal does not dissent and give notice of it within a reasonable time after being informed of what has been done, his assent and satisfaction will be presumed.

"An agent is personally liable if he makes himself so expressly, or if he transcends his authority or departs from its terms and directions, or if he conceals his character as agent, or if he purposely conceals the name of his principal, or, perhaps, if he does not actually state the name of his principal."

It is the duty of the agent to follow implicitly his instructions, and to keep his principal fully and promptly informed in regard to the business intrusted to him.

An agent is liable for interest if he has made it on the money in his hands, but not if it has lain idle.

As a general rule, an agent cannot appoint a substitute, or delegate his authority to another. But a power of substitution may be expressly given, or it may be inferred from the nature of the act to be performed, or where there is a known and established custom of substitution.

## POWER OF ATTORNEY.

A Power of Attorney, or Letter of Attorney, is a written instrument, usually under seal, by which authority is given to one person to perform some lawful act for another.

Authority to execute a deed must be given under seal, and be acknowledged by both husband and wife, and must be done in the name of the principal.

Upon the death of the principal, the authority delegated by power of attorney ceases, and all subsequent acts under it are void. The authority intended to be conferred should be expressed in clear and intelligible terms, and be properly executed, attested, and acknowledged.

## Form of Power of Attorney.

Know all Men by these Presents, That I,  
 of \_\_\_\_\_, County of \_\_\_\_\_, and State  
 of \_\_\_\_\_, have made, constituted, and appointed,  
 and by these presents do make, constitute, and appoint  
 \_\_\_\_\_, of \_\_\_\_\_, County of \_\_\_\_\_  
 and State of \_\_\_\_\_, my true and lawful attorney,  
 for me, and in my name, place and stead, and in my behalf, to (here  
 insert the things which the attorney is to do); giving and granting  
 unto my said attorney full power and authority generally to do and  
 perform all and every act and thing whatsoever requisite or proper  
 to effectuate all or any of the premises, with the same powers, and  
 to all intents and purposes with the same validity, as I, if personally  
 present, could (giving and granting, also, unto my said attorney  
 full power to substitute one or more attorney or attorneys under  
 him my said attorney in or concerning the premises, or any part  
 thereof, and the same at his pleasure to revoke; and) hereby ratify-  
 ing and confirming whatsoever my said attorney (or his substitute  
 or substitutes) shall and may do by virtue hereof in the premises.

In Witness whereof, I have hereunto set my hand and affixed  
 my seal, this first day of September, in the year of our Lord 1882.

Signed, sealed, and delivered

in the presence of

[SEAL.]

HENRY R. LINDEN,

WM. H. MOULT.

N. B.—By omitting the words in brackets, no power to appoint a sub-  
 stitute is given.

## Short Form.

Know all Men by these Presents, That

do make, constitute, and appoint  
true and lawful Attorney for and in name

with power, also, an attorney or attorneys under for  
that purpose to make and substitute, and to do all lawful acts requisite for effecting the premises; hereby ratifying and confirming all that the said attorney or substitute or substitutes shall do therein by virtue of these presents.

In Witness whereof, have hereunto set hand and  
seal the day of , in the year of our Lord  
one thousand eight hundred and  
Signed, sealed, and delivered [L. s.]  
in the presence of

## Power to Transfer Stock.

Know all Men by these Presents, That I, K. W. Y., of Oswego, County of Oswego, and State of New York, do make, constitute, and appoint Leonard D. Gray, of the same place, my true and lawful attorney, for me, and in my name and behalf, to sell, transfer, and assign unto Hosea W. Hunter, of said Oswego (or, any other person or persons), One Hundred Shares in the capital stock of the Syracuse National Bank, in Syracuse, State of New York, standing in my name on the books of said corporation; and to do all necessary acts and to make the necessary acquittances and discharges to effect the premises (add, if desired, and I do further empower him to substitute any person or persons under him, with like power); hereby ratifying and confirming all my said attorney (or his substitute or substitutes) shall lawfully do by virtue hereof.

In Witness whereof, etc.

## Power to Receive Dividend.

Know all Men by these Presents, That I, H. Y. Bell, of Oswego, County of Oswego, State of New York, do constitute and appoint Hiram Howell, of Meridian, Cayuga county, to receive from the Cashier of the Oswego National Bank the dividend or dividends now due me on all stock standing to my name on the books of the said bank, and to receipt for the same; hereby ratifying and confirming all that by him may lawfully be done by virtue hereof in the premises.

Witness my hand, etc.

Signed and delivered in presence of, etc.



## SEALED INSTRUMENTS.

A contract which is under seal is called in law a *specialty*. Bonds are of this class. All other contracts, whether oral or in writing, are called *parole* contracts. A *specialty* is distinguished from a simple contract by its *seal*. An impression upon wax, wafer, or, as in most of our States, a scrawl of ink, attached to the signature, is regarded as a sufficient seal. A seal implies consideration, and is in general absolute; but in New York a seal is only *prima facie* evidence of consideration, which may be rebutted as if the instrument were not sealed.

A specialty is not negotiable like a promissory note: it may be assigned, however (*see Form of Assignment*), the assignee taking it at his own peril, and having only the rights of the original obligee: if the obligor has any set-off or claim against the obligee at the time of the assignment, the assignee will be compelled to allow it.

If the assignee, previous to taking the assignment, obtains from the obligor an admission in writing, or in the presence of witnesses, that he has no defence or set-off, the obligor is liable to the assignee for the whole amount.

In Pennsylvania, and in some other States, bonds are made legally assignable; and the assignees can sue in their own name when they are for payment of money, and drawn "to order" or "to assigns," and the assignment is "under hand and seal" and in the presence of two or more witnesses; the intent of the act being to enable the assignee to sue in his own name, and prevent the obligee from releasing after assignment.

If they are not drawn in the above form, bonds may be assigned for a valuable consideration, with permission to sue in the assignor's name.

The indorsement in blank of a specialty does not make the indorser liable as in the case of a negotiable note.

An instrument under seal is not barred by the statute of limitations like an ordinary debt. *See page 305.*

## BONDS.

A Bond is an obligation for the payment of money, or for the performance or non-performance of certain acts, with a

penalty annexed in case of failure to comply with the conditions of the bond. It requires no technical words: any sealed writing which distinctly acknowledges a debt is a bond; but generally there is a condition added, that if the obligor does some particular act, the obligation shall be void, or else shall remain in full force.

The penalty in a bond is usually double the amount of the real debt, for the purpose of covering the full debt, together with interest and costs. All that can be recovered of a *penalty* in a bond, in addition to the amount of the debt, is the interest and costs; but when a specified amount is agreed upon for liquidating damages, it must be distinctly so expressed, and then such specified sum is the amount to be paid.

Where it is the intention to bind the heirs of the obligor, the term *heirs* must be named. Executors and administrators are bound though not named.

### Common Form of Bond.

Know all Men by these Presents, that I, \_\_\_\_\_, in the county of \_\_\_\_\_, and State of \_\_\_\_\_, am held and firmly bound unto \_\_\_\_\_, of \_\_\_\_\_, in the county of \_\_\_\_\_ and State aforesaid, in the sum of One Thousand Dollars, lawful money of the United States, to be paid to the said \_\_\_\_\_, or his certain attorney, executors, and administrators or assigns; to which payment, well and truly to be made and done, I do bind myself, my heirs, executors, and administrators, and every of them, firmly by these presents. Sealed with my seal, and dated the \_\_\_\_\_ day of \_\_\_\_\_, Anno Domini one thousand eight hundred and \_\_\_\_\_.

The condition of this obligation is such, that if the above bounden \_\_\_\_\_, his heirs, executors, administrators, or any of them, shall and do well and truly pay, or cause to be paid, unto the above-named \_\_\_\_\_, his executors, administrators, or assigns, the just and full sum of Five Hundred Dollars, lawful money, aforesaid, with legal interest for the same, on or before the \_\_\_\_\_ day of \_\_\_\_\_ next, without fraud or further delay, then the above obligation to be void and of none effect, or else to be and remain in full force and virtue.

Signed, sealed, and delivered in  
the presence of

[SEAL.]

### Clause for Judgment Bond.

And I do hereby authorize and empower any attorney of any court of record in the State of \_\_\_\_\_, or elsewhere, to enter judgment against me, my heirs, executors, and administrators, and in the favor of the above-named \_\_\_\_\_, his executors, administrators, or assigns, for the above sum, as of the past, present, or any future term of said court, with release of errors, costs of suit, etc.

### Interest Clause.

And it is hereby expressly agreed, that should any default be made in the payment of the said interest, or of any part thereof, on any day whereon the same is made payable, as above expressed, and should the same remain unpaid and in arrear for the space of thirty days, then and from thenceforth, that is to say, after the lapse of the said thirty days, the aforesaid principal sum of Five Hundred Dollars, together with all arrearage of interest thereon, shall, at the option of the said \_\_\_\_\_, his executors, administrators, and assigns, become and be due and payable immediately thereafter, although the period above limited for the payment thereof may not then have expired, anything hereinbefore contained to the contrary notwithstanding.

If the obligation of a bond becomes impossible by the act of God, *after* making it, the penalty is saved ; if it be impossible at the time of making it, it is said the condition alone is void, and the bond shall stand, single and unconditional.

Where several payments are due at different times on a bond, if one payment is delayed and the bond is so drawn, judgment may be recovered for the whole of the real debt, with stay of execution on the several payments till such specified times as those payments become due.

**A Deed** is a writing or instrument sealed and delivered. As generally used, it is a writing for the conveyance of property.

In Pennsylvania, a scroll enclosing the word "seal" or "L. S.," is a good and valid seal ; but not in all the States.

**A Fee-Simple** interest is the absolute ownership in an estate.

**A Warranty Deed** is so called because the grantor cove-

nants to insure and defend the lands mentioned against the persons and to the extent specified.

**A General Warranty** covenants and warrants against all persons whatsoever ; a **Special Warranty**, only against himself, his heirs, and those claiming under him. Deeds by executors, administrators, or guardians generally contain no warranty ; and every requisition of the law should be complied with, to obtain a good title.

**A Quit-Claim Deed** is one which conveys all the interest which the grantor may possess, whatever it may be, in the land specified.

**A Deed Poll, or Single Deed**, like a quit-claim deed, is made by one party only (for example, a sheriff's deed).

**A Trust Deed** is given to persons to hold for the use of some other person who is entitled to the proceeds, profits, or use of the property.

**A Ground-Rent Deed** conveys land, with a reservation of a certain sum of money in the nature of rent, to be paid at specified times, and may be for life, for a term of years, or in fee.

Delivery of the Deed is necessary to complete the transfer of the property, and the title does not pass until the deed is delivered.

**A Mortgage** is a conditional conveyance of property as a pledge for the security of a debt.

All kinds of property, real and personal, which may be sold absolutely may be mortgaged. As a general thing, *chattel mortgages*, or mortgages on personal property, are not good against third parties or creditors unless the property is actually delivered, or the mortgage acknowledged and recorded.

Deeds and Mortgages should be recorded in the county where the land is located, as a protection to the holders against subsequent sales or mortgages to other parties.

When a mortgage is paid by instalments, each payment should be receipted upon the record of the mortgage as it is made.

When the debt is paid, the mortgagee is bound under a penalty to enter satisfaction on the records within a limited time ; and care should be taken by the mortgagor that it be done.

SEALED RECEIPT OR RELEASE.

General Release of all Demands.

Know all Men by these Presents, that I, Howard C. Burton, of New York, for and in consideration of the sum of Three Hundred and Seventy-Five Dollars to me paid by George C. Taylor, of Philadelphia, the receipt of which I do hereby acknowledge, have remised, released, and forever discharged, and I do for myself, my heirs, executors, and administrators, remise, release, and forever discharge, the said George C. Taylor, his heirs, executors, and administrators, of and from all debts, demands, actions, and causes of action, in law or equity, of every kind, character, and nature soever, against him, from the beginning of the world to this day.

In Testimony whereof, I have hereto set my hand and seal, this thirteenth day of July, A. D. 1882.

Signed, sealed, and  
delivered in the presence of

HORACE C. BURTON. [SEAL.]

ETHAN YOUNG,  
ALEX'R R. RUNDLE.



CONTRACTS.

**A Contract** is an agreement, upon sufficient consideration, to do, or not to do, some specified thing.

**A Consideration** may be *any benefit to the party promising, or some trouble or injury to the party receiving the promise.*

In general, an offer or proposal becomes a contract as soon as it is accepted, and acceptance may be made before the expiration of the time limited, or at any reasonable time before knowledge of a retraction of the offer.

In the majority of the United States, no action can be brought against a person upon an agreement not to be performed within one year from the making of it, unless some note or memorandum of the agreement be signed by the party to be charged, or his lawfully appointed agent.

Persons under twenty-one years of age, married women, and insane persons, are incompetent to make a contract. A minor, however, may contract for necessities; so, also, may a married woman when her husband, without good reason, refuses to make suitable provision for her.

The subject-matter of the contract must be possible ; it must also be lawful. A contract founded upon fraud, or to do an illegal or immoral act, is void. A contract in total restraint of the exercise of a man's trade or profession would not be enforced by the courts, because it is against public policy ; but a contract restraining him in any particular city or place is valid.

Care bestowed in clearly expressing the contract in plain and unambiguous language, may be the means of preventing lawsuits and the loss of friendship as well as the loss of money. "Three things should be attended to in writing a contract. 1st. Weigh well your words, and ascertain their exact import or value. 2d. Use enough of them to express all that you mean or intend by the contract. 3d. Arrange them in such a manner that they have but one meaning, and that the meaning you intend."—HON. JOEL JONES.

Verbal evidence may be admitted to explain, but not to change, the original contract.

**Contracts of Sale.**—A sale is a contract for the transfer of property for a valuable consideration. The subject-matter and the price must be certain, or capable of being made so, to constitute a sale. The subject-matter should be perfectly identified, ascertained, and designated, so as to be distinguished from everything else. After the sale is completed, the goods are at the risk of the purchaser.

If in the contract for the sale of goods no time be mentioned for payment, the law implies a contract to pay for them on delivery, and the buyer is entitled to the goods only on payment or tender of the price. The buyer acquires a right of property by the contract, but until he pays or tenders the price he does not acquire a right of possession. If the sale be made upon credit and nothing be said as to the time of delivery, the buyer is entitled to possession immediately ; although the seller can reclaim the goods if the buyer is insolvent, and they are in the hands of a common carrier or have not yet come into the actual possession of the buyer.

In the several States, excepting Louisiana, no contract for the sale of any goods is binding, when the price is above a certain sum, unless the buyer shall accept part of the goods so sold and actually receive the same or give something in part

payment, or unless some writing of such bargain be made and signed by the party to be charged. The sum required in Massachusetts and New York is \$50; in Vermont, \$40; in Connecticut, \$35; in New Hampshire, \$33.33; and in New Jersey, \$30.

In dissolving a contract, the law requires that it shall be done by the same means that render it binding: if the contract was under seal, the release or discharge must be under seal also; if the contract was required by law to be in writing, it cannot be dissolved by a verbal agreement.

### General Form of Agreement.

*This Agreement*, made the sixteenth day of February, A. D. 1868, between JOHN T. EVANS, of Sandusky, County of Erie and State of Ohio, of the first part, and HENRY W. WARD, of Houston, County of Shelby and State aforesaid, of the second part,

*Witnesseth*, That the said JOHN T. EVANS, for the consideration hereinafter mentioned, doth covenant and agree to and with the said HENRY W. WARD, that (*here insert the agreement on the part of Evans*).

And the said HENRY W. WARD, in consideration of the covenant of the said party of the first part, doth hereby covenant and agree to and with the said JOHN T. EVANS, that (*here insert the agreement on the part of Ward*).

*In Witness whereof*, we have hereunto set our hands and seals, the year and day first above written.

Signed, sealed, and delivered

in presence of

EDWARD P. HARTELL.

THOS. J. TURNER.

JOHN T. EVANS. [SEAL.]

HENRY W. WARD. [SEAL.]

### Agreement of Sale.

*Agreement* made this day between Thomas J. Raymond, of New York City, of the first part, and Leonard Munroe, of said city, of the other part, as follows:

Said Thomas J. Raymond, for the consideration hereinafter mentioned, doth hereby agree to deliver to said Leonard Munroe, at his store in said city, as the same may be required from time to time,—the whole to be delivered before the first day of May next ensuing the date hereof,—two thousand pounds Old Government Java Coffee, equal to a sample exhibited.

In consideration whereof, said Leonard Munroe hereby agrees to pay to the said Thomas J. Raymond twenty cents per pound for each and every pound so delivered, in the notes of the said Leonard Munroe, payable three months after date, to be given at the end of each and every month, for the amount of coffee then delivered under this agreement.

Witness the said parties, at New York, this       day of       ,  
 A. D. one thousand eight hundred and eighty  
 W. P. THORNTON, }  
 K. M. WILSON,     } Witnesses present. THOS. J. RAYMOND.  
 LEONARD MUNROE.

### A Bill of Sale of Goods.

Know all Men by these Presents, that I, Jared K. Long, of Buffalo, for and in consideration of the sum of five hundred dollars to me in hand paid by John Cottrell, of the same place, at and before the sealing and delivery of these presents, the receipt whereof is hereby acknowledged, have bargained, sold, and delivered, and by these presents do bargain, sell, and deliver, unto the said J. Cottrell, *One Thousand* (1000) bbls. Linseed Oil, now in store at Pittsburgh, Pa.

To have and to hold the said goods unto the said J. Cottrell, his executors, administrators, and assigns, to his and their own proper use and benefit forever. And I, the said Jared K. Long, for myself and my heirs, executors, and administrators, will warrant and defend the said bargained premises unto the said J. Cottrell, his executors, administrators, and assigns, from and against all persons whomsoever.

Witness my hand and seal, this tenth day of March, 1882.

Sealed and delivered in

the presence of

JARED K. LONG. [L.S.]

JAS. CLARK.

HENRY R. DAMON.

### Affidavit for Goods Sold and Delivered.

State of       , County of       , ss.

Francis J. Murray, of       , in said county, being duly sworn (or affirmed), deposes and says that Byron C. Gates, of       , county of       , and State of       , is justly and



truly indebted unto him, the deponent, in the sum of dollars, for goods sold and delivered by him to the said Byron C. Gates; and that he has given credit to the said Byron C. Gates for all payments and set-offs to which he is entitled; and that the balance claimed, according to the foregoing account, is justly due; and that the said account is correctly stated.

Sworn and subscribed, this      day of      , A. D. 1882, before me,  
HENRY C. BEACH.

*Commissioner for the State of* .



## GUARANTEES.

**A Guarantee** is an engagement whereby one man, called the guarantor, binds himself as security for the performance of certain acts by another.

A guarantee, to be binding, should be for a consideration; as in law all promises made without a consideration are valueless.

Though not always necessary, it is preferable that the guarantee be in writing; because the evidence of the fact is then so much easier of proof. In some States, the guarantee must express the consideration for which it was granted.

Guarantees of commission merchants, binding them to warrant the solvency of the purchasers of the goods they sell on credit, need not be in writing.

The words of a guarantee should be strictly construed, and not taken to mean more or less than the words clearly express. A guarantor is not liable beyond the scope of his engagement: a mere recommendation or overture to guarantee is not sufficient.

A guarantee must be accepted, to make it a contract; and the guarantor must have notice, either direct or implied, of its acceptance within a reasonable time.

In Pennsylvania, by act of April 26, 1855, no action shall be brought upon any special promise to answer for the debt or default of another, unless the agreement, or some memorandum or note thereof, be in writing. This act does not apply to contracts in which the consideration is less than twenty dollars.

Guarantees do not continue to transactions which take place after a change is made in the firm to which they were given, unless such change is expressly provided for.

In some States, unless the creditor can show that it would be useless to proceed against the debtor, he must first institute proceedings against him before he can resort to the guarantor.

A guarantor, after paying the debt, has a right to substitute himself in the place of the creditor, and is entitled to receive from him all the securities held by him for the principal debt.

#### Guarantee of a Debt not yet Incurred.

PITTSBURGH, Dec. 8, 1882.

MESSRS. GEO. H. STUART & BRO.,  
18 Bank Street, Philadelphia.

GENTLEMEN:—The bearer, Mr. Henry G. Layton, of this place, intends visiting your city for the purpose of purchasing goods. Should you be disposed to furnish him with such goods as he may call for, we hereby guarantee the payment for any purchases he may make within one month from this date, to any amount not exceeding five thousand dollars. Yours, truly,

S. T. HUMBOLDT & Co.

*Note.*—The consideration in the above guarantee is the selling of goods on credit to H. G. Layton.

#### Another.

CINCINNATI, Dec. 11, 1882.

GEO. H. WHELAN, Esq.

DEAR SIR:—I hereby guarantee the payment of any bill or bills of merchandise Mr. J. L. Johnson may purchase from you, the amount of this guarantee not exceeding five hundred dollars (\$500), and to expire at the end of three months from date.

Respectfully, yours,

BENJAMIN PATTEN.

#### Guarantee of a Debt already Incurred.

LOUISVILLE, KY., Feb. 19, 1882.

MESSRS. M. C. HARRISON & Co.,  
New Orleans.

GENTLEMEN:—In consideration of one dollar, paid me by yourselves, the receipt of which I hereby acknowledge, I guarantee that the debt of four hundred dollars, now owing to you by George W. Perkins, shall be paid at maturity. Very respectfully, yours,

LEONARD H. MORTON.

## PARTNERSHIP.



**A Partnership** is a voluntary contract between two or more persons to place their property, labor, or credit, or some or all of them, in some lawful business, and to divide the profit, or bear the loss, in certain proportions. (*See page 234.*)

A partnership is not constituted merely by an interest, but depends on the joint liability to loss, as well as on the participation in the profits. A stipulated portion of the profits as mere compensation for labor or services does not constitute a partnership.

**A General Partnership** is one formed for trade generally, without limitations, and comprehends whatever business the partners may engage in.

**A Special Partnership** is one which is confined by the terms of the agreement to some particular kind of trade or business, or some particular transaction or speculation.

**A Limited Partnership** is one in which the responsibility of one or more of the partners is limited to the amount invested by him or them in the concern. In a limited partnership the special partner has the advantage of investing where the profits are equal to the gains of actual business, without risking more than the sum contributed. The laws relative to limited partnerships are of a nature to require great care on the part of any one about to become a special partner. The statute law of the State in which such partnership is formed must be complied with literally and accurately. The advice of able counsel should in all cases be taken before entering into such a partnership, in order to avoid assuming the responsibilities and liabilities of a general partner.

A person who lends his name as a partner, though he contribute neither money nor time, nor receive any share of the profits, or who suffers his name to continue in the firm after he has ceased to be an actual partner, is liable to third persons as such.

Each partner has full power to bind the firm by all acts and contracts within the scope of the partnership business.

A partner cannot make the firm responsible for his separate debt, nor enter into engagements binding the firm which are unconnected with, and foreign to, the partnership.

Each partner may buy and sell and make contracts for the firm, and may receive and pay money and become a party to negotiable paper in the name of the firm.

In signing contracts relating to partnership business, partners should always use the proper style of the firm, not merely their own name, nor any other name than the full and exact name of the firm.

In general, however, one partner cannot bind the other by an instrument under seal, unless the other expressly assents, is present when it is executed in the joint name, or subsequently ratifies it; though he may execute a release of a debt due the firm. Nor can one partner bind the firm by a guarantee not in the regular course of business, unless it be afterwards adopted by the firm.

One partner may discharge himself from liability by giving express notice to any customer, or other person, not to trust one or more of his copartners.

A partnership may be dissolved by the expiration of the time limited for its continuance, by the voluntary act of one or all of the parties, by the death, insanity, or bankruptcy of either, and by judicial decree. If no precise period is mentioned for its continuance, a partner may withdraw at any time; and even if formed for a definite time, a partner may, by giving due notice, dissolve the partnership as to all future capacity of the firm to bind him by contract, subjecting himself thereby to a claim for damages for a breach of the covenant.

In cases of a dissolution by death, it is the surviving partner or partners alone to whom belong the right and duty of disposing of the property, collecting the assets, and paying thereout the debts: the representatives of the deceased have no right to do more than to call upon the surviving partner or partners to render an account.

A creditor of a partner may sell only such partner's individual interest in the surplus partnership property, after all claims

upon the firm are discharged. The purchaser is not bound to become a partner, nor are the others bound to admit him.

The dissolution of a partnership by consent of the parties should be indorsed on the articles of copartnership, and immediate actual notice communicated to the parties who have had previous dealings with the firm. Notice in a newspaper is sufficient as to persons who have had no previous dealings with the firm; but it is not sufficient for those who have had, as the law requires express notice to the debtors.

Upon dissolution all the members are liable, individually, for the contracts and debts of the firm existing at that time. In general, after dissolution, the power of one partner to bind the firm ceases; but either partner, without agreement as to the mode of liquidation, may sell such property as he may have in possession, and may collect and receipt for debts, being liable to be called to account in a general settlement.

When one partner assigns his interest in the firm, the word "release" must be used, as it alone, it is said, can pass the whole interest.

Guarantees given to a partnership do not continue valid to a new firm.

#### Agreement between Partners.

All partnership agreements should be written, and each partner should hold a copy. Although not essential to their validity that the agreement should be in writing, yet unpleasant feelings and difficulties, as well as serious pecuniary loss, may be prevented by having the terms embodied in clear and distinct language.

Partnership articles should specify the names of the several partners, and the name or firm under which the partnership is to be conducted, the kind of business to be transacted, the time of commencement and intended duration of the partnership, the amount of the capital contributed by each partner, the manner in which the gains and losses are to be shared, whether interest is to be allowed on capital and at what rate, the amount which may be withdrawn yearly by each partner for private use, and the manner of disposing of the partnership effects in the event of a dissolution. Other stipulations may be inserted at the pleasure of the parties.

## Form of Articles of Copartnership.

**Articles of Agreement**, made and concluded this *first* day of *January*, in the year A. D. *one thousand eight hundred and eighty-two*, between ROBERT R. JOHNSON, of the first part, and CHARLES S. BURTON, of the second part, both of Pittsburgh, county of Allegheny, State of Pennsylvania. The said parties have agreed, and by these presents do agree, to associate themselves as copartners for the purpose of carrying on the General Hardware Business on the following terms, to the faithful performance of which they mutually bind and engage themselves, each to the other, his executors and administrators.

**FIRST.**—The name, style, and title of such partnership shall be R. R. Johnson & Co., and it shall continue for three years from the date hereof, except in case of the death of either of said partners within the said term.

**SECOND.**—That the said Robert R. Johnson contributes, as his share of the joint stock, merchandise valued at Ten Thousand Dollars (\$10,000), a schedule of which is contained in the stock-book of the firm, and the sum of Five Thousand Dollars (\$5000) in cash; and that the said Charles S. Burton contributes the sum of Three Thousand Dollars (\$3000) in cash.

**THIRD.**—All profits which may accrue to the said partnership shall be divided, and all losses happening to the said firm, whether from bad debts, depreciation of goods, or any other cause or accident, and all expenses of the business, shall be borne by the said parties, in the proportion of *three-fourths* by the said Robert R. Johnson, and of *one-fourth* by the said Charles S. Burton.

**FOURTH.**—The said R. R. Johnson and Charles S. Burton shall devote and give all their time to the business of said firm, and use their utmost endeavors, to the best of their skill and ability, to conduct the business for their mutual advantage, and will not, within the period above named, engage in any other trade or business to their private emolument or advantage.

**FIFTH.**—That books of account shall be kept, in which shall be entered a full and exact account of all the purchases, sales, transactions, and accounts of said firm, and which shall always be open to the inspection of both parties, and their legal representatives respectively. An account of stock shall be taken, and an account

between the said parties shall be settled, once in every year, and as much oftener as either partner may, in writing, request.

SIXTH.—Neither party shall assume *any* obligation or liability, verbal or written, either in his own name or the name of the firm, for the accommodation of any other person or persons whatsoever, without the consent, in writing, of the other party; nor shall either party lend any of the funds of the copartnership without such consent of the other partner.

SEVENTH.—No large purchase shall be made, nor any transaction out of the usual course of the hardware business be undertaken, by either of the partners, without previous consultation with and the approbation of the other partner.

EIGHTH.—The said Robert R. Johnson shall not withdraw from the funds or joint stock of the firm more than the sum of Eighteen Hundred Dollars per annum, nor more than Three Hundred Dollars in any one month; and the said Charles S. Burton shall not withdraw more than the sum of Eight Hundred Dollars per annum, nor more than One Hundred Dollars in any one month. Each (or neither) party shall be allowed interest on his share of capital invested; and if, at the expiration of the year, a balance of profits be found due to either partner, he shall be at liberty to withdraw said balance, or to leave it in the business, provided the other partner consent thereto.

NINTH.—At the expiration of the aforesaid term, or earlier dissolution of partnership, the stock or its proceeds, after paying the debts of the firm, shall be divided in the proportion of five-sixths to the said Robert R. Johnson, and of one-sixth to the said Charles S. Burton; but, if the said parties or their legal representatives cannot agree in the division of stock then on hand, it is hereby agreed that the matter shall be referred to the arbitration of H. L., C. A., and D. F. (or three competent disinterested persons, selected as may be arranged); and what they shall direct and determine therein shall be binding and conclusive upon all concerned.

TENTH.—And it is further agreed, for the faithful performance of the aforesaid articles of agreement, that either party, in case of any violation of them, or either of them, by the other, shall have the right to dissolve this copartnership immediately upon his becoming informed of such violation.

**In Witness Whereof**, we have hereunto set our hands and seals the day and year above written.

Executed and delivered

in presence of

HENRY C. RODGERS.

JOHN L. DARROW.

ROBERT R. JOHNSON. [SEAL.]

CHARLES S. BURTON. [SEAL.]

### Clauses to be Inserted in Partnership Agreements when Desired.

**Not to be Bound, or Indorse Bills, for Others.**—And that neither of the said parties shall, during this copartnership, enter into any deed, covenant, bond, or judgment, or become bound as bail or surety, or give any note or bill of exchange, or accept any bill, with or for any person whatsoever, without the consent of the other first had and obtained.

**A Majority to Control.**—That in all matters respecting the transactions of the partnership and the management of the business, the expressed opinion of the majority of the parties to this agreement shall govern and be binding on all of said parties; and in cases of difficulty they shall have power to wind up or sell the concern.

**Not to Trust Any One against the Wish of a Partner.**—And that no merchandise belonging to the firm shall be sold to any person or persons after notice from either of said partners that such persons are not to be credited or trusted.

**Neither Partner to Assign his Interest.**—And it is agreed between said parties that neither of them shall, without the consent of the others, previously obtained in writing, sell or assign his share or interest in the joint concern, to any person or persons whatsoever.

### Agreement to Continue Partnership.

#### *By Indorsement on the Original Articles.*

**Whereas** the within-mentioned partnership has expired by the limitations contained therein (or will expire on, etc.), it is hereby agreed that the same shall continue upon the same terms, with all the provisions and restrictions herein contained, for the further term of five years, from the                      day of

**In Witness Whereof**, we have hereunto, etc.

Witnesses.

GEO. C. HARTLEY.

M. H. MARTIN.

ARTHUR B. CLARK. [SEAL.]

MATTHEW H. RALSTON. [SEAL.]



**Agreement to Dissolve a Partnership.***By Indorsement.*

We, the undersigned, do mutually agree that the within-mentioned partnership be and the same is hereby dissolved; except for the purpose of final liquidation and settlement of the business thereof, and upon such settlement wholly to cease and determine.

Witness our hands and seals, this            day of, etc.

Signed, sealed, and delivered

in presence of

HARVEY C. CHESTER.

PORTER L. FIELDS.

CHAUNCEY S. DOUGLASS. [SEAL.]

REUBEN H. HOWARD. [SEAL.]

**Public Notice of Formation of Partnership.**

**Notice of Copartnership.**—The undersigned have this day formed a copartnership under the name and style of Gregory, Anderson & Co., for the purpose of carrying on the wholesale dry-goods business, at 689 Chestnut Street, Philadelphia.

GEORGE W. GREGORY.

ANDREW L. ANDERSON.

SAMUEL T. HOLDEN.

PHILA., Jan. 1, 1882.

**Public Notice of Dissolution of Partnership.**

**Notice of Dissolution.**—The copartnership heretofore existing between George W. Gregory, Andrew L. Anderson, and Samuel T. Holden, under the firm of Gregory, Anderson & Co., is this day dissolved by mutual consent (or, has this day expired by limitation, or as the case may be).

George W. Gregory is authorized to settle all claims against, or to receive all amounts due, the above-named firm.

(Or, Either partner will sign in liquidation.)

(Or, The business will be continued by George W. Gregory and Samuel T. Holden, under the name of Gregory & Holden, who are authorized to settle the accounts of the late firm.)

GEORGE W. GREGORY.

ANDREW L. ANDERSON.

SAMUEL T. HOLDEN.

Feb. 1, 1882.

**Public Notice of Change of Partnership.**

**Notice.**—Thomas Y. Benton is admitted this day as a member of our firm. The business will hereafter be conducted under the name of Porter, Hudson & Co.

July 1, 1882.

BENSON J. PORTER.  
JACOB L. HUDSON.

**Another.—One Partner Retiring.**

**Notice.**—Mr. Lewis N. Dixon retires from our firm this day. The business will be conducted hereafter under the name of Rudolph & Hunter.

Jan. 1, 1882.

LEWIS N. DIXON.  
JARED L. RUDOLPH.  
PHILIP T. HUNTER.

**Short Form of Assignment of Bond.**

For value received, I do hereby assign and set over the within obligation, and all moneys due thereon, unto James M. Walters, his executors, administrators, or assigns, *without recourse*.

**Witness** my hand and seal, this twentieth day of January, 1882.  
Signed, sealed, and delivered

in presence of

MILTON N. SOMERS.  
HENRY K. PARK.

JOHN L. RAYBURN.

**LANDLORD AND TENANT.**

**A Landlord** is one who owns real estate which for a stated period, and at a stipulated rental, is in possession of another, called a tenant. The contract between the two parties is called a lease. It is advisable, in all cases, that leases be in writing, and that each party have a copy. The terms of a lease should be specified clearly; verbal promises are of no effect to add to or vary a written lease: the lease must speak for itself.

*A lease from year to year* is where no definite time is fixed for its termination; *a lease for years* is every estate which is to expire at a certain specified period.

A tenant for years may underlet, unless forbidden by the lease.

Where a lease for one or more years expires, and by implied

consent the tenant remains in possession, he is not a tenant at will, but is considered a tenant from year to year.

If no time is stated for the payment of the rent in a lease for a year, the rent is not due until the end of the year, unless the law of the State is different. In New York, in the absence of special agreement, the rent is due on the usual quarter days.

To terminate a tenancy from year to year, each party is bound to give notice within the time required by the statute law of the particular State. The notice should be in writing, directed to the tenant; if he cannot be found, leaving the notice at the dwelling-house will be sufficient. No notice is necessary to be given to the under-tenants. It is advisable for the landlord to preserve a duplicate of the original notice, with the time and manner of service indorsed on it, and signed by the witness or witnesses.

A tenant from year to year is entitled to *six* months' notice in New York, Vermont, Kentucky, and Tennessee; to three months' notice in Pennsylvania and some of the other States; and to two months in Massachusetts.

A tenant is not responsible for taxes, except when so specified in the lease; and, when paid by him, he can deduct the amount from the rental value.

A landlord is under no legal obligations to repair, unless he has expressly covenanted to do so; nor a tenant, in the absence of a covenant, beyond injuries occasioned by his voluntary negligence.

#### Form of Lease.

*This Agreement Witnesseth*, That Henry T. Morton doth hereby let unto Robert H. Walters that certain house and lot situated No. 1801 Green Street, Fourteenth ward, city of Philadelphia, for the term of one year from the fifth day of June, 1882, at the rent of six hundred dollars per year, to be paid in quarterly portions in advance; and the said Robert H. Walters doth hereby, for his heirs, executors, and administrators, covenant and promise to pay to the said Henry T. Morton, or his assigns, the said rent in the proportions aforesaid; and the said Robert H. Walters, his executors and administrators, shall and will not, at any time during the said term, let or demise, or in any manner dispose of, the hereby demised premises, or any part thereof, for all or any part of the term hereby

granted, to any person or persons whatever, nor occupy or use the same in any other manner than as a private dwelling, without the consent and approbation, in writing, of the said Henry T. Morton or his assigns, first had for that purpose; and at the expiration of the said term yield up and surrender the possession of the said premises, with the appurtenances, unto the said Henry T. Morton or his assigns, in the same good order and condition as the same now are, reasonable wear and tear thereof, and accidents happening by fire or other casualties, excepted.

And the said Robert H. Walters, his executors and administrators, hereby agree that all the personal property on the premises shall be liable to distress; and also all personal property, if removed therefrom, shall, for thirty days after such removal, be liable to distress, and may be distrained and sold for rent in arrear, the said Robert H. Walters, his executors and administrators, hereby waiving all right to the benefit of any laws now made or hereafter to be made, exempting personal property from levy and sale for arrears of rent.

It is hereby further agreed, that if the above-named Robert H. Walters should continue on the above-described premises after the termination of the above contract, then this contract is to continue in full force for another year, and so on, from year to year, until legal notice is given for a removal.

*In Witness whereof*, the said Henry T. Morton and Robert H. Walters have hereunto set their hands and seals, the fifth day of June, one thousand eight hundred and eighty-two.

Sealed and delivered in

the presence of

JAMES T. RODGERS.

ROBERT H. WALTERS. [SEAL.]

HENRY T. MORTON. [SEAL.]

### Security for Rent.

I, George L. Mason, do hereby agree to be responsible to Henry T. Morton, or his assigns, for the true and faithful performance of the above-named contract on the part of Robert H. Walters.

*In Witness whereof*, I have hereunto set my hand and seal, the fifth day of June, one thousand eight hundred and eighty-two.

Sealed and delivered in

the presence of

JAMES T. RODGERS.

GEORGE L. MASON. [SEAL.]

Notice to Quit by the Landlord.

SIR:—Please take notice that you are hereby required to surrender and deliver up possession of the house and lot known as No. 7 Day Street (or as the case may be), which you now hold of me, and to remove therefrom on the first day of \_\_\_\_\_ next, or at the expiration of the current year of your tenancy.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 1882.

To MR. L. N. SELSER.

J. G. BOND,

*Landlord.*

Notice to Quit by the Tenant.

Please take notice that on the 1st day of May next I shall quit possession and remove from the premises I now occupy, known as house and lot No. 7 Day Street, in the city of New York.

Dated this first day of Jan., 1882. Yours, etc.,

To MR. J. G. BOND.

L. N. SELSER.



MERCANTILE CORRESPONDENCE.

In all composition, three things require attention: the thoughts, their arrangement, and the language employed.

On business subjects, as on other matters, he writes best who writes from a full mind. No one is expected to write well on any subject who has but little acquaintance with it. This is the reason why otherwise well-educated persons frequently fail in their efforts to write a good mercantile letter: they are ignorant not only of the technicalities of business phraseology, but of business itself.

The qualifications required at school are a good foundation; but they will not dispense with a knowledge of business dealings and of the peculiar styles of expression employed in commercial correspondence. Familiarity with the technicalities of the counting-house is gained only by constant practice; and facility and skill are not obtained until such technicalities have been mastered. To a business man, a terse mercantile phrase is as full of meaning as a formula is to a mathematician, and a few words are often all that is necessary to impart what would require from others many circuitous sentences.

A well-written mercantile letter furnishes not only a model

for acquiring form and phraseology, but is also a *record* and an *explanation* of the business transacted. Business letters often partake of the nature of contracts, when mistakes, omissions, or uncertainty would involve serious loss. They should be clear and concise; there should be nothing ambiguous, nothing omitted, nothing superfluous. Men in business are too much occupied to waste time either in reading or writing long letters filled with what is irrelevant or useless.

Good writing materials should be selected. It is poor economy to use inferior articles; and the whole appearance of the letter is affected by the quality of the ink and paper used.

The handwriting should be uniform in height and slope, and each letter should be so distinct as to prevent any ambiguity in deciphering it. Serious mistakes resulting in heavy losses and vexatious lawsuits have been caused by illegible writing.

In applications for situations in business houses, the handwriting has much to do with success. It is almost useless for a poor writer to expect employment in a counting-house. Merchants do not wish either the discredit or the inconvenience of bad writing.

When testimonials are required, and it is desired to preserve the original, a copy should be enclosed, and marked "copy" at the top of the page.

The date of a letter should be stated correctly and distinctly, as it is frequently a matter of considerable importance. In England the day is placed before the month; thus, 11th August, instead of August 11th, as in this country. In writing from a city, it is well to mention the street and number.

The form of complimentary address to be adopted depends upon the degree of intimacy and the relative position of the parties. In writing to a gentleman to whom you are an entire stranger, he is addressed as "Sir." "Dear Sir" is used on nearly all occasions, frequently to a stranger, unless a certain formality is required. "My dear Sir" implies a very friendly relationship. A married lady is addressed as "Madam" or "Dear Madam," and an unmarried lady as "Miss" or as "Dear Miss," usually with her last name affixed, although

many, on good authority, use *Madam* in addressing either married or single ladies. "*Reverend Sir*" is used in addressing a clergyman; "*Esteemed Sir*" is usual when some degree of formality is required. Judges and Members of Congress should be addressed by the title of "*Honorable*." In writing to a firm, company, or any number of persons associated in a body, the address is "*Gentlemen*."

The place where the person resides who is written to is given, to provide against any accident or attempt at fraud which would destroy the superscription and thus prevent it from being used as evidence.

Before beginning a letter, the subject of it should be fully comprehended, and if at all complicated, the different points to be considered should be noted. So should all verbal instructions of what is to be written.

In answering a letter, after acknowledging its receipt, each point requiring consideration should be taken up in order and discussed in a separate paragraph, before any new subject is mentioned.

Clearness is promoted by giving each subject a separate paragraph, and when orders are sent with communications on other matters, the order should be on a separate paper.

All orders should be clear and explicit, every word should be unmistakable. The goods desired should be specified exactly, and if they are the same as the last order, refer to the date, and if mentioned on the last invoice, to the page of entry.

Give full shipping directions, unless a previous direction renders this unnecessary; which road or transportation company; whether by freight or express, etc. Otherwise heavy charges or troublesome delays may be needlessly incurred.

In letters containing remittances or enclosures, the amount and papers enclosed should be distinctly mentioned, to guard against loss, and that the letter may be used as evidence, if necessary. When drafts are drawn, it is customary to inform the person on whom they are drawn, that he may be prepared to meet them at the proper time.

Some firms have a printed form of receipt, and also a printed form of letter for acknowledging remittances received, which

they use in order to save the time and labor required in an extensive correspondence.

Instructions to agents and commission merchants should be in the plainest terms, with full directions how to act in any contingency, that there may be no misunderstanding or dispute. Agents should keep their principals well advised in reference to the condition and progress of the business with which they are intrusted.

A bill or statement of account is usually sent at stated periods, and should of itself call attention to its settlement. Sometimes the words "Please remit" are written on one end of the bill for that purpose. Many houses, however, are in the habit of sending out statements which are merely for the purpose of comparing accounts.

When it becomes necessary to request payment, it should be done in gentlemanly terms, even if there has been considerable delay. A man loses more than he gains when he indulges in rash or insulting language. A bitter word, when spoken, may be forgotten; but, when once written, it becomes abiding evidence of the irascibility, if not insult, of the writer. A decided yet respectful manner is productive of the best effects. An air of civility should pervade every letter, yet there should be nothing servile or affected.

In writing to others on business pertaining solely to one's own affairs or for his own benefit, a stamp should be enclosed, with which to prepay the postage on the answer. To persons who have a large correspondence, the postage is an item of some importance.

Letters of introduction and recommendation should not be sealed, that the persons whom they concern may have an opportunity of knowing their contents.

All business letters requiring an answer should receive immediate attention. Negligence in this respect is a species of incivility. Every letter, as soon as read and its contents attended to, should be neatly folded, indorsed with the name of the writer and the date of the receipt and answer, and then filed. Many find it convenient to index all letters, and make a brief analysis of each. The modern letter-files may save some of the labor of the methods just mentioned.



Knight, Adams & Co.,  
 Boston.  
 Rec'd Jan. 18, /82.  
 Ans'd " 19, "

It is advisable that copies of all letters, and also all papers of importance, be retained for future reference. A *fac-simile* copy of a letter is admitted as evidence after notice to the other party in the cause to produce the original.

The mere mechanical folding of a letter is not unworthy of attention. A letter carelessly written, clumsily folded, or ill directed, denotes either ignorance of what is proper, or a want of respect to the person addressed.

If not called for within ten days, re-  
 turn to James Smith, 13 Olive Street,  
 St. Louis.

STAMP.

*Messrs. Eldredge & Bro.,*  
*No. 17 North Seventh Street,*  
*Philadelphia,*  
*Pa.*

The superscription should be distinctly written. From neglect of this precaution, thousands of letters are sent every month to the dead-letter office.

When sent to a large city, the letter should be directed to the street and number, as well as to the post-office and State. The postage stamp should be placed upon the upper *right-hand* corner. When it is important to know whether the letter has been received or not within a certain time, a request for its return to the writer, if not called for, should be placed upon the *left-hand* end of the envelope.

When letters are registered at the post-office, a receipt signed by the receiver is returned to the sender of the letter, but the post-office does not hold itself responsible for anything lost when so sent.

Limited space prevents our offering more than a few forms of letters which relate to transactions of the most frequent occurrence. Nearly all of those here given have been taken from the letter-books of extensive houses, and are presented not as models of superior excellence, but for the purpose of aiding those who wish to become familiar with the language and formula of business correspondence.



## MERCANTILE LETTERS.

### 1. Offering Goods.

*New York, Feb. 15, 1882.*

*Messrs. L. T. Morton & Co.,*

*Baltimore.*

*Gentlemen:*

*We take the liberty of enclosing a few samples of Black Taffetas, just received per Steamer Niagara. They are in patterns of about 14 yards, full 24 inches wide, at \$2.10 per yard. Should you need any of them, we shall be happy to receive your order.*

*Yours, respectfully,*

*A. W. Colton & Co.,*

*per Jas. T. King.*

## 2. Declining Offer to Buy.

MESSRS. GRAY, SMITH & CO.

PHILADELPHIA, Aug. 3, 1882.

*Gentlemen*:—Yours of the 25th ult. is received. We are under the necessity of declining to fill your order upon the terms proposed by you. On receipt of fifteen hundred dollars, we will ship the goods, with the understanding that the balance will be paid within sixty days from the date of shipment. Hoping that these terms will be satisfactory, we remain

Yours, very respectfully,  
HENRY L. PARK & SON.

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## 3. Declining Offer to Sell.

MESSRS. L. H. ALWARD & Co.,

MILWAUKEE, NOV. 1, 1882.

*Philadelphia.*

*Gentlemen*:—We are in receipt of your favor of the 30th ult., and have likewise received the samples of Poplins, but, having as many goods of this description as we require for our present sales, we must decline handing you an order from samples forwarded.

Respectfully, yours,  
CHANDLER & Co.

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## 4. Order for Goods.

MESSRS. MARSHALL & HOWLAND,

MEMPHIS, TENN., Aug. 10, 1882.

*New York.*

*Gentlemen*:—You will please ship us at your earliest convenience Three (3) Half-chests Imperial Tea (Andreas, \$257), same as in last bill; also, Two (2) Half-chests of *best Imperial* (Queen of the North, \$19, or something better). Ship by Great Western Dispatch, and mark goods as follows:

J. M. ORWIG & BRO., *Memphis, Tenn.,*  
*Care GOULD & LINTON, Cincinnati, Ohio.*

Please write across Bill of Lading, "Insured in consignees' open policy in the Globe Insurance Co. of Cincinnati," and send Gould & Linton the amount of Invoice, that they may enter on our policy-book. Your early shipment will much oblige

Yours, very truly,  
J. M. ORWIG & BRO.

## 5. Order for Goods.

UTICA, N. Y., Dec. 14, 1882.  
816 Furman Street.

TO STAR MANUFACTURING CO.,

*Paterson, N. J.*

*Gentlemen:*—Please forward, on receipt of this, per Adams Express, to the address as above, C. O. D., or draw on me, as you may prefer,

10 doz.  $\frac{1}{2}$  Amer. Locks.

25 " Mason's Shovels.

I hope you will send those of best quality, and on your most favorable terms. Should the goods and prices be satisfactory, I expect to give you additional orders soon.

Yours, truly,

GEO. H. HESTON.

## 6. Enclosing Invoice and Bill of Lading.

Per "Wyoming."

PHILADELPHIA, March 17, 1882.

MESSRS. L. M. SEATON & Co.,

*New Orleans.*

*Dear Sirs:*—We confirm our last letter of 12th inst., and hand you herewith enclosed B. of L. and Invoice of Cases E, H,  $\frac{1}{2}$  632 and 633, ordered by your Mr. Carlton, which we have shipped this day on board Steamer Wyoming. Amt., \$1250 $\frac{50}{100}$ ; due June 17th.

Should you need any of our qualities of Cassimeres, we shall be pleased to fill your orders on the best terms possible.

Yours, truly,

WELLS, FISK & Co.

## 7. Concerning Credit at a Banker's.

"Edinburgh."

LIVERPOOL, 12 Feb., 1882.

MESSRS. JOHN SIMPSON & Co.,

*Philadelphia.*

*Gentlemen:*—We have your favor of 29th ult., and, as desired, have confirmed a credit for £500 to Messrs. F. & B. Brown & Co.

Your instructions respecting shipment and insurance have our attention.

We are, gentlemen,

Your obedient servants,

GREEN, RICHARDS & Co.

**8. Advice concerning Shipment.**

MESSRS. JOHN SIMPSON & Co.,

LIVERPOOL, 17 March, 1882.

*Philadelphia.*

*Dear Sirs:*—We are advised that the under-mentioned goods are coming to us for shipment on your account, and we purpose forwarding them by the conveyance noted below. Should they not arrive here in time for shipment, a further advice will be sent you.

We state the value as given for entry, and remain

Yours, respectfully,

GREEN, RICHARDS & Co.

Per S. S. "Delaware," for Philadelphia, sails 22d inst.

J. S. C., 1/3. 3 cases, £224, from F. & B. Brown & Co.

**9. Enclosing Invoice.**

Per the "City of Paris."

MANCHESTER, 20 March, /82.

MESSRS. JOHN SIMPSON & Co.,

*Philadelphia.*

*Dear Sirs:*—We have the pleasure to hand you herewith invoice of the packages noted below, which we trust will result in all respects to your satisfaction.

To cover present shipment, we apply for funds to Messrs. Green, Richards & Co., as usual.

Great activity prevails in our market, and prices generally are advancing.

We are, dear sirs,

Your obedient servants,

£220. 18. 0. net cash, Mar. 20/82.

F. & B. BROWN & Co.

J. S. C., 1/3, per steamer "Delaware."

**10. Advising Receipt of Invoice.**

MR. JAMES L. KING, *Boston.*

ST. LOUIS, April 5, 1882.

*Dear Sir:*

Your favor of March 29th, with B. of L. and Invoice, was received in due time. The goods are all that we desired; and for your promptness and care in filling our order, accept our thanks.

Enclosed find in payment Holmes & Bros.' Draft on First National Bank of Boston, at sight, for \$1875<sup>50</sup>/<sub>100</sub>. Please acknowledge receipt per return mail, and oblige

Yours, respectfully,

THOS. L. SMITH & Co.

**11. Consigning Goods to be sold on Commission.**

MESSRS. SAMUEL G. PORTER &amp; Co.,

CINCINNATI, May 11, 1882.

*New York.*

*Dear Sirs:*—Your favor of 7th inst. is at hand. We enclose you Invoice and Bill of Lading of 100 bbls. Mess Pork and 50 firkins of Butter, shipped this day per Merchants' Line, to be sold for our account, as per agreement. We request you not to sell for less than Invoice price, and if you succeed in disposing of this lot satisfactorily, you may be almost sure of receiving further consignments from us. We have drawn on you at ten days' sight, through Phoenix Bank, for One Thousand Dollars. Awaiting your advices, and hoping soon to hear from you, we remain,

Very truly, yours,

---

M. JOHNSON & Co.**12. Advising of Shipment.**

MESSRS. H. R. STANLEY &amp; Co.,

45 CALLIOPE STREET,

NEW ORLEANS, NOV. 4, 1882.

*Cincinnati.*

We herewith enclose Bill of Lading and Invoice of Molasses and Sugars, amounting to \$4233.75, which we have this day shipped per steamboat Star of the West, as per your order of 27th ultimo.

We have taken considerable pains to select such lots as we thought would suit you, and hope we have succeeded. Sugars are advancing. We send with this a list of our present quotations. Awaiting your further orders, and grateful for those received, we remain,

Very respectfully,

Your obedient servants,

---

W. MORRISON & Co.**13. Shipment of Goods on Joint Account.**

MESSRS. S. BOGARDUS &amp; Co.,

JERSEY CITY, N. J., NOV. 11, 1882.

*Springfield, Ill.*

*Dear Sirs:*—According to our agreement, we have this day forwarded you, per Union Transportation Co., Two Hundred Sacks Coffee, Invoice and B. of L. enclosed, to be sold for our account jointly. One-half the invoice has been charged to your account.

Hoping that this venture may be so profitable that it will lead to many others, we are,

Very respectfully, yours,

---

L. ROCKFORD & BRO.

**14. Advising of Consignment.**

MESSRS. T. H. HAWKINS &amp; Co.,

HAVANA, June 4, 1882.

*Boston.*

*Gentlemen:*—We have this day shipped you, per steamer Juniata, Farington, master, 1200 bbls. P. R. Sugar, T. H. H., and 228 bbls. Cuba S. W. Sugar, L. B. C., to be sold as per our agreement. Please find Invoice and Bill of Lading enclosed.

From the present state of the market, we are induced to hope that this lot will meet with ready sale at good prices. Should you succeed in disposing of this Invoice satisfactorily, we expect to send you another early in next month.

Awaiting your advice, we remain

Yours, respectfully,

\_\_\_\_\_  
LINNARD, BATES & Co.,

per S. T. GERTER.

**15. Enclosing Account Sales.**

MESSRS. M. JOHNSON &amp; Co.,

NEW YORK, June 10, 1882.

*Cincinnati.*

*Dear Sirs:*—Enclosed we send you Account Sales of Pork and Butter shipped us on May 11th. The Net Proceeds, \$1750.62, due per average July 2d, we have placed to the credit of your account; the result, we hope, will be satisfactory.

We shall be pleased to receive further consignments from you, and will endeavor to dispose of them on the most advantageous terms. Thanking you for past favors, we remain,

Truly, yours,

\_\_\_\_\_  
SAMUEL G. PORTER & Co.

**16. Enclosing Account Sales.**

MR. L. G. FREDERICKS,

PHILADELPHIA, Oct. 17, 1882.

*Galveston, Tex.*

*Dear Sir:*—We have the pleasure of sending you enclosed Account Sales of 200 sacks Wool, received per "Towanda," and sold for our joint account. For your share of net proceeds, and amt. due you for our half invoice, we enclose sight draft on Gentin, Skwortz & Co., of your city.

As prices are rising, we think it a favorable time for another shipment. If favorably disposed, please send us another on same terms as the last.

Yours, truly,

\_\_\_\_\_  
HENRY EDWARDS & Co.

**17. Enclosing Note for Discount.**CHAS. R. COLEMAN, Esq., *Cashier.*

BALTIMORE, Feb. 11, 1882.

*Dear Sir:*—We offer for discount, enclosed, J. Brown's note, Jan. 12th, at ninety days, for \$4250.75. By discounting the same you will much oblige

Yours, respectfully,

THOS. H. WHITMAN &amp; Co.

**18. Enclosing Account Current.**

MR. HENRY T. MORRIS,

SANDUSKY, O., Jan. 1, 1882.

*Nebraska City.*

*Dear Sir:*—We respectfully call your attention to the enclosed Account Current, with interest calculated to this date, showing a balance in our favor of \$3275.<sup>50</sup>/<sub>100</sub>. If you find correct, please remit us a Draft at sight for the amount, and oblige

Yours, respectfully,

D. RUNDEL &amp; Co.

**19. Enclosing Remittance.**

MESSRS. J. T. ANTHONY &amp; Co.,

SAVANNAH, Jan. 21, 1882.

*Manchester, Eng.*

*Gentlemen:*—Your favor of 2d inst., covering statement of account, is at hand, and upon examination we find it correct. Enclosed please find Richardson & Cowden's 1st and 2d of Exchange on Brown, Shipley & Co. for Two Hundred and Sixty Pounds 7/5, in settlement of account to 1st inst.

Please acknowledge receipt, and oblige

Yours, very truly,

B. F. MOORE &amp; Co.,

per D. B. MARTIN.

**20. Another.**

MESSRS. A. L. WATSON &amp; Co.,

TRENTON, April 10, 1882.

*Philadelphia.*

*Dear Sirs:*—Enclosed find my Check on First National Bank of this city for Twenty-Two Hundred and Fifty Dollars, in payment of Bills of

|                   |           |
|-------------------|-----------|
| July 21 . . . . . | \$1262.10 |
| " 25 . . . . .    | 872.00    |
| " 28 . . . . .    | 115.90    |
|                   | <hr/>     |
|                   | \$2250.00 |

Please acknowledge receipt, and oblige

Yours, respectfully,

JAMES ANDERSON.



## 21. Acknowledging Remittance.

BUFFALO, Jan. 12, 1882.

Received from Messrs. George H. Jackson & Co., Five Hundred and Fifty  $\frac{25}{100}$  Dollars on account.

\$550. $\frac{25}{100}$ .

H. D. CLINTON &amp; Co.

MESSRS. GEORGE H. JACKSON &amp; Co.,

BUFFALO, Jan. 12, 1882.

*Utica, N. Y.*

*Gentlemen:*—Above please find receipt for remittance contained in yours of 10th inst., for which we are obliged. We find in your statement a variation in two items, those of December 6th and 19th. Can you favor us with an explanation, as we have no credits reducing the amount of \$35 to  $\$25.\frac{50}{100}$ , or  $\$675.\frac{35}{100}$  to  $\$654.\frac{75}{100}$ ?

Waiting your reply, we remain,

Respectfully, yours,

H. D. CLINTON &amp; Co.

## 22. Another.

MESSRS. THOS. M. YOUNG &amp; Co.,

ALBANY, Nov. 13, 1882.

*Syracuse.*

*Gentlemen:*—We have the pleasure to acknowledge the receipt of your esteemed favor of 10th inst., containing your notes dated

Sept. 1, at 3 mos., for \$425.66,

“ 15, “ “ 425.66,

Oct. 1, “ “ 425.67,

Amounting to Twelve Hundred and Seventy-Six  $\frac{80}{100}$  Dollars, which we have placed to your credit in settlement of your account.

Please accept our thanks, and, requesting the favor of your future orders, we remain,

Very truly, yours,

CHAS. L. RIQUA &amp; Co.

## 23. Asking for Settlement.

MR. HENRY G. SANDERS,

WORCESTER, May 25, 1882.

*Concord.*

*Dear Sir:*—We respectfully call your attention to our statement of account rendered April 3d, a settlement of which at your earliest convenience will much oblige

Yours, very respectfully,

HORACE BOYD &amp; Co.

**24. Enclosing Draft for Acceptance.**

W. B. PERRY, Esq.,

PORTLAND, Dec. 18, 1882.

*Castine, Me.*

*Dear Sir:*—We enclose our draft on you for acceptance, which please let us have by return mail, and oblige,

Respectfully, yours,

JAMES HOLLAND & Co.  

---

**25. Return of Accepted Draft.**

MESSRS. JAMES HOLLAND &amp; Co.

CASTINE, Dec. 25, 1882.

*Gentlemen:*—Enclosed please find your draft, dated 18th inst., for \$400, with acceptance.

My absence from the city has caused the delay in replying to your favors.

Yours, truly,

W. B. PERRY.  

---

**26. Requesting Payment.**

MR. B. S. VERNON,

ROCHESTER, June 19, 18—.

*Syracuse.*

*Dear Sir:*—If convenient, please let us have the amount of your bill, March 15th, for \$187.50. We desire to close all our accounts by the 30th inst., and have need of all the funds due us. Please remit without delay, and much oblige

Yours, respectfully,

LANSING, MASON & Co.  

---

**27. Another.**

MESSRS. DOUGLASS &amp; HEATH.

LOUISVILLE, Nov. 2, 18—.

*Dear Sirs:*—We are obliged again to ask you for the balance of your account, now four months past due. We are much inconvenienced by your delay, and have waited longer than we think ought to be expected. The account must be speedily settled, and, if we do not hear from you by the 15th inst., will draw on you at five days' sight. If the draft is not protected at maturity, we shall be compelled to adopt some other mode of settlement.

Very truly, yours,

W. RANDOLPH &amp; Co.

**28. Another.**

MR. G. Y. HENDERSON,  
*Dover, Del.*

WILMINGTON, April 5, 1882.

*Dear Sir*:—Enclosed please find our usual monthly statement, amounting to \$375<sup>25</sup>/<sub>100</sub>, for which, if found correct, we shall be pleased to receive remittance by 30th inst.

Should we receive no remittance by that time, we propose to draw on you at sight for the amount, unless in the mean time we are otherwise advised.

Yours, respectfully,

JAMES S. SMITH & Co.

**29. Enclosing Notes for Collection.**

CASHIER FIRST NATIONAL BANK,  
*Cincinnati.*

PHILADELPHIA, July 29, 1882.

*Dear Sir*:—Enclosed find for collection,

|                                          |                  |
|------------------------------------------|------------------|
| Note J. Smith, due Aug. 3/6,             | \$810.20         |
| “ J. Jones, “ “ 8/11,                    | 600.00           |
| Acceptance Morton & Co., due Aug. 10/18, | 920.62           |
|                                          | <u>\$2320.82</u> |

If paid, please remit draft for proceeds.

Yours, very respectfully,

GEORGE V. MAUS.

**30. Asking for Terms, etc.**

MESSRS. STEWART, WALLACE, ATKINSON & Co.,  
*Philadelphia, Pa.*

TERRE HAUTE, IND., Sept. 25, 1882.

*Gentlemen*:—Having recently started business in this place, and believing I can sell your goods to advantage, I will be obliged if you will send me your price list and best terms. I expect to buy chiefly for cash, but may want to buy on time occasionally. For reference, you may call on Messrs. L. Carson & Co., of your city, with whom I have had considerable dealing.

Very truly,

MORTON R. BAILEY.

## 31. Asking for Terms.

BEAUFORT, N. C., Nov. 18, 1882.

MESSES. H. L. BETTLE & Co.,  
Philadelphia, Pa.

*Gentlemen:*—We have about 300 Bales of Cotton to dispose of, and would like to send it for sale if terms are favorable. Will you be kind enough to send us your terms for selling, and the usual expenses, with a report of present market prices?

Truly yours,

---

 RICHARD L. LEE.

## 32. Reply enclosing Terms.

PHILADA., PA., 12/18/82.

WALTER L. CROWELL,  
Beaufort, N. C.

*Dear Sir:*—In reply to yours of 12th inst., we enclose a list of rates, including commission and expenses. The market at present is quite active, and prices have an upward tendency. We mail with this to-day's quotations.

We shall be pleased to receive your consignments, and will endeavor to dispose of them for you at the highest market rates.

Yours, truly,

## 33. Another of Same Character.

ALBANY, N. Y., Jan. 27, 1883.

MR. MORTON B. BAILEY.

*Dear Sir:*—Yours of 18th inst. received. Enclosed we send you price lists and our customary discounts. Any order with which you may favor us we will take pains to fill at the lowest market prices. We have called on your references, and will send you anything you may wish to buy on credit on our regular terms.

Yours, truly,

---

 ESSEN & WARDEN.

## 34. Proposing a Joint Adventure.

PHILADA., Oct. 23, 1882.

MESSES. DENTON & MORRIS,  
St. Louis, Mo.

*Gentlemen:*—We have an opportunity to obtain a fine lot of Cassimeres and Satinets just suited to your market, valued at about twenty-five hundred dollars (\$2500). If you think favorably of it, and will unite with us, we will forward the goods, charging you

with one-half their cost, the goods to be sold by you at your usual charges, for your and our joint account.

Please let us know, on receipt of this, if you accept our proposition, because if there is delay the goods may be sold to other parties.

Very truly, yours,

MUNSON, EDWARDS & Co.

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**35. Reply to above.**

ST. LOUIS, Oct. 27, 1882.

MESSRS. MUNSON, EDWARDS & Co.,

*Philada., Pa.*

*Gentlemen:*—We accept your proposition as contained in your favor of 23d inst., and you may send the goods immediately. There is a brisk demand at present for woollen goods, and the market has an unusually small supply. We think we can sell to good advantage.

Yours, truly,

DENTON & MORRIS,

---

**36. Offering a Special Lot.**

PITTSBURG, PA., May 4, 1882.

MESSRS. GRIFFITHS, ELLIS & Co.,

*Wheeling, Va.*

*Gentlemen:*—Having a large quantity of machinery, bolts, bars, and other material remaining after our fire, we desire closing them out to a reliable firm, and therefore give you the benefit of a first bid on them. If it could be arranged, it would be advisable for you to send some person to examine and make an offer for the goods before the 1st of June, as we cannot engage to hold them for you after that date.

Yours,

VERNON & HUDSON.

---

**37. Inquiring as to Character.**

NEW ORLEANS, April 27, 1882.

MR. SAMUEL D. OTIS.

*Dear Sir:*—Will you do us the favor of informing us if Jas. P. Ellman, of your place, is personally known to you as worthy of credit? As he proposes to make large purchases, a prompt reply will greatly oblige,

Yours, respectfully,

WILLIS & GARRISON.

**38. Another of Same Tenor.**

SPRINGFIELD, ILL., Oct. 10, 1882.

*Dear Sir:*—Mr. Henry B. Carver has referred us to you for information in regard to his character and responsibility. Will you oblige us by stating your opinion concerning his business standing?

An early reply will be considered a great favor.

Very truly, yours,

ELLWOOD, BURNS & Co.

TO MR. LAWRENCE O. BUCKLEY.

---

**39. Favorable Reply.**

BATON ROUGE, LA., April 30, 1882.

MESSRS. WILLIS &amp; GARRISON.

*Gentlemen:*—In reply to yours of the 27th inst., we can say, from several years' acquaintance and business dealing with Mr. Ellman, that he is one whom we highly esteem, and is worthy of any credit he may ask of you.

Yours, truly,

SAML. D. OTIS & Co.

---

**40. Unfavorable Reply.**

INDIANAPOLIS, IND., Oct. 14, 1882.

MESSRS. ELLWOOD, BURNS &amp; Co.

*Gentlemen:*—Yours of the 10th inst. received. I answer I can only say that, from the slight acquaintance I have with Mr. Carver, received from general reports, I should hesitate to extend him credit without some other name as security.

Very truly,

LAWRENCE O. BUCKLEY.

---

**41. Letter of Introduction.**

WORCESTER, March 2, 1882.

*Dear Sir:*—This will introduce to you my friend Mr. Samuel S. Price of this city. He intends staying a few days in your place, which he visits on business; and I take the liberty of recommending him to your kind attention.

He is a gentleman of excellent acquirements, and we know him to be responsible to the extent of his engagements. Any attention or favor that you may render him shall be considered a personal favor, which I shall be happy to reciprocate.

Very sincerely, yours,

TO JARED L. MORTON, Esq.

CHAS. M. LESTER.

**42. Letter of Recommendation.***To whom it may concern:—*

BUFFALO, Oct. 13, 1882.

The bearer of this, Mr. Edward K. Mitchell, has been in our employ for three years past as salesman and book-keeper, and we have ever found him diligent and faithful in the discharge of his duties, and one who endeavored to make his employers' interest his own. He is correct and reliable in his accounts, and is well qualified to act as book-keeper or correspondent.

We cheerfully recommend him to any who may require the services of a trustworthy and competent person in their counting-house.

Very respectfully,

J. W. CRESSON &amp; Co.

**43. Advising of Shipment.**

CLEVELAND, O., Aug. 26, 1882.

MR. GEO. R. CHAPMAN,

*West Salem, Ohio.*

*Dear Sir:*—Enclosed please find Bill of Lading and Invoice of Queensware, amounting to \$318<sup>35</sup>/<sub>100</sub>, forwarded by rail this day, as per order of 10th inst.

The goods leave us in good condition, and we have taken pains to select the best and most attractive styles.

Should anything be found objectionable, we will be obliged if you will notify us promptly.

Yours, truly,

L. WETMORE &amp; Co.

**44. Advising of Draft.**

CLEVELAND, O., June 3, 1882.

MR. H. T. HAWKINS,

*Harvard, Ill.*

*Dear Sir:*—As we are in want of funds, we take the liberty of drawing on you at five days' sight for bills of

|                   |          |
|-------------------|----------|
| Jan. 10 . . . . . | \$575.00 |
| Feb. 12 . . . . . | 300.00   |
|                   | <hr/>    |
|                   | \$875.00 |

Please protect, and much oblige

Yours, truly,

BROWN &amp; WORTHINGTON.

## 45. Another.

1224 COMMERCE STREET,  
PHILADA., PA., Sept. 9, 1882.

Messrs. J. W. JENKINSON & Co.,  
Petersburg, Va.

*Gentlemen:*—We have under this date drawn on you at ten days' sight, favor T. W. Roberts, for Four Hundred Ninety-Five and  $\frac{50}{100}$  Dollars, for Invoice forwarded you yesterday as per order.

We have a fine assortment of English Merinoes, just imported, of which we enclose sample, and which we can offer at 35 cents per yard.

An order will be very gratefully received.

Very truly, yours,  
REUBEN LOCKWOOD & Co.,  
per W. K. PERKINS.

---

## 46. Another.

MADISON, WIS., July 3, 1882.

MR. SAMUEL VINCENT,  
Ann Arbor, Mich.

*Dear Sir:*—We have drawn on you at five days' sight for Three Hundred Twenty-Six and  $\frac{50}{100}$  Dollars (\$326 $\frac{50}{100}$ ), to balance your account, as per statement enclosed.

Please honor, and oblige

Yours, truly,  
LEE, STEVENS & BENNETT.

---

## 47. Soliciting Employment.

137 MT. VERNON STREET,  
PHILADA., Oct. 10, 1882.

MR. JAS. R. FLORENCE.

*Dear Sir:*—Having been informed that you are in want of an assistant in your store, I respectfully offer my services, believing myself fully competent to perform the duties required. I have had considerable experience, and can give satisfactory and unquestionable references, and security if desired. If you think I may suit, I shall be happy to call upon you at any time you may please to appoint.

An early answer will much oblige,

Yours, very respectfully,  
ROBERT T. PRESTON.



**48. Application for Agency.**

RICHMOND, VA., June 12, 1882.

TO THE PRESIDENT AND DIRECTORS OF THE  
STAR MANUFACTURING Co.,  
Wheeling, W. Va.

*Gentlemen:*—Having superior facilities for handling your goods, and a connection that enables me to sell many goods similar to yours, I am induced to apply for an agency in this city, believing that my abilities can be exerted to the advantage of your company.

I am prepared to furnish satisfactory references and security of undoubted character.

For any information you may desire regarding my character or fitness for the office I solicit, I respectfully refer you to Messrs. Hudson & Elliot of your city, and can refer you to others if desired.

Requesting the favor of an early reply, I am

Very respectfully, yours,

JAS. O. DUDLEY.

**49. Answer to an Advertisement.**

315 OLIVE STREET, ST. LOUIS, April 27, 18—.

*Gentlemen:*—In answer to your advertisement in the "Democrat" of to-day, for an assistant in your counting-house, I respectfully offer my services to your firm. I am without experience in business, but have a desire to enter mercantile life, am willing to work, and have just graduated from our city High School.

If you will give me a trial, I will devote myself to your interests and endeavor to acquit myself to your entire satisfaction. For reference as to my character or ability, I would offer the names of

Mr. George H. Bowen, 116 Washington Avenue,

Messrs. J. F. Dwight & Co., 20 South Main Street.

Should a personal interview be desired, please address as above.

Very respectfully,

HERMAN L. FOSTER.

**50. Enclosing Subscription.**

SACRAMENTO, CAL., July 10, 1882.

MESSRS. ELDRIDGE & BRO.

For the enclosed Fifty Cents please send "THE TEACHER," for one year, commencing with the August number.

Respectfully,

E. J. MORRISON.

**51. Application for a Situation as Book-keeper.**

MESSRS. K. K. LANGTON &amp; Co.,

COLUMBUS, O., Feb. 19, 1882.

*Cincinnati, O.*

*Gentlemen:*—Having learned from Mr. Charles K. Minturn that you desire the services of a book-keeper, I respectfully offer myself as an applicant for the situation. I have been engaged for two years in the wholesale house of L. R. Bullock & Co. as clerk and assistant book-keeper, and have a good knowledge of accounts. My business acquaintance is extensive in the western part of this State and the northern part of Kentucky, and I could therefore influence considerable trade.

I enclose copy of testimonial from my late employers, and would also respectfully refer you, as to my character and ability, to

Messrs. Albert L. Hancock &amp; Sons, Wholesale Grocers, Cincinnati.

" Stringer, Burt &amp; Co., Iron Merchants, "

" F. L. Williams, Esq., City Solicitor, "

Any communication which you may be pleased to make, addressed as above, will receive prompt attention.

Very respectfully, yours,

FREDERICK K. JOHNSON.

**52. Recommendation enclosed in the above.**

(Copy.)

COLUMBUS, June 1, 1881.

The bearer, Frederick K. Johnson, has been in our employ as assistant book-keeper for over two years, and we have always found him to be honest, steady, and correct in his habits and deportment, and well qualified for any position of trust in a counting-house. We cheerfully recommend him as a competent book-keeper, and one who will earnestly apply himself to promote the interests of his employers.

Respectfully,

L. R. BULLOCK &amp; Co.

**53. Order for a Book.**

MADISON, Feb. 26, 1882.


MESSRS. ELDRIDGE & BRO., *Philadelphia.*

Enclosed find One Dollar and Fifty Cents (\$1.50), for which please send me one copy of the "Crittenden Commercial Arithmetic and Business Manual," and oblige

Yours, truly,

HENRY M. CURTIS.

## Bank Draft.

|                                                                  |                                                                                                                       |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>MISSISSIPPI VALLEY BANK.</b>                                  |                                                                                                                       |
| \$500.                                                           | <i>Vicksburg, Miss., Jan. 10, 1883.</i>                                                                               |
| <i>Pay to the Order of</i> ----- <i>Richard G. Wallace</i> ----- |                                                                                                                       |
| ~~~~~ <i>Five Hundred</i> ~~~~~ <i>Dollars.</i>                  |                                                                                                                       |
| To Manhattan Bank,<br>No. 1243.                                  |  <i>J. W. Carpenter,</i><br>Cashier. |

## Transfer of Stock.

|                                                                                                                                                                                                                                                                                                               |                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| No. 495.                                                                                                                                                                                                                                                                                                      | <i>Denver, Colorado.</i><br><i>November 23, 1882.</i> |
| For value received--- <i>I</i> ---hereby assign, transfer, and set over<br>unto--- <i>H. W. Atkinson</i> ---all my right, title, and interest<br>in~~~~~ <i>One Hundred</i> ~~~~~Shares of the Capital Stock of<br><b>THE DENVER WATER COMPANY</b><br>standing in my name upon the books of the said Company. |                                                       |
| Attest:                                                                                                                                                                                                                                                                                                       | <i>Howard C. Campbell.</i>                            |
| <i>Albert H. Stanley, Secretary.</i>                                                                                                                                                                                                                                                                          |                                                       |

## Dividend Check.

|                                                                                                                                        |                                               |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <i>St. Louis, Jan. 3, 1882.</i>                                                                                                        |                                               |
| <b>MERCHANTS' NATIONAL BANK.</b>                                                                                                       |                                               |
| Pay to----- <i>Theodore Fitch</i> -----or Bearer<br>~~~~~~ <i>Five Hundred</i> ~~~~~ <i>Dollars,</i><br>and charge to Dividend No. 20. |                                               |
| \$500.                                                                                                                                 | <i>H. W. Lemaston,</i><br>GENERAL BOOKKEEPER. |

Order on Treasurer of Joint-Stock Company.

No. 17.

Nashville, Sept. 28, 1882.

Treasurer of the NASHVILLE GAS CO.

Pay to the Order of *Erastus V. Hunt,*Two Hundred and  $\frac{57}{100}$  Dollars.\$200  $\frac{57}{100}$  PHILIP G. YOUNG, Secretary.

THOS. R. LONG, President.

Copy of an Exchequer Bill issued in the Reign of  
Queen Anne.£12 10s.

EXCHEQUER,

A 28/24. Pursuant to an Act of Parliament, Anno 1709, for enlarging the Capital Stock of the Bank of England, &c. This Bill entitles the bearer to twelve pounds, ten shillings, with interest at a farthing a day. To be received in all aids, taxes, loans, and payments whatsoever to Her Majesty, and to be paid to the bearer by the Governor and Company of the Bank of England, from time to time, as the same shall be paid into the exchequer by any receivers or collectors of Her Majesty's revenue, aids, taxes or supplies; and be thence reissued and at all times by such receivers or collectors out of any public money in any of their hands, as directed by the said Act.

Bank Deposit Ticket.

Deposited April 8, 1882, at the

COMMONWEALTH NATIONAL BANK.

By *Eldredge & Bro.*

|                                       | Dollars.      | Cts.      |
|---------------------------------------|---------------|-----------|
| BANK NOTES, 5's and upwards . . . . . | 675           | 00        |
| " " 1's and 2's . . . . .             | 25            | 00        |
| SPECIE . . . . .                      | 50            | 00        |
| CHECKS, as follows . . . . .          | 325           | 75        |
|                                       | 465           | 50        |
|                                       | <b>\$1541</b> | <b>25</b> |

## STOCK SUBSCRIPTION LIST.

## Stock Subscription List.

We, the undersigned, do subscribe to the Articles of Association of the OREGON MANUFACTURING COMPANY, of Cleveland, and hereby agree to take the number of Shares of the Capital Stock set opposite our respective signatures, at the par value of Fifty Dollars per Share, one-half to be paid on April 1, 1883, and the remaining half within ten days after notice duly signed by the President and Secretary.

| DATE.   | NUMBER OF SHARES.   | AMOUNT.  | SIGNATURES.                | RESIDENCE.        | NO. OF<br>CFT. | LEDGER<br>FOL. |
|---------|---------------------|----------|----------------------------|-------------------|----------------|----------------|
| 1883.   |                     |          |                            |                   |                |                |
| Jan. 15 | One Hundred Shares  | \$5,000  | E. C. Swinley. [SEAL.]     | 184 Medville, St. | 1              | 4              |
| " "     | Fifty Shares        | 2,500    | Elmerne Meyer. [SEAL.]     | Chicago, Ill.     | 3              | 8              |
| " 16    | Two Hundred Shares  | 10,000   | Eden Deann. [SEAL.]        | 439 Main St.      | 2              | 6              |
| Feb. 20 | Twenty-five Shares  | 3,750    | Chas. W. Phillips. [SEAL.] | Springfield, Ill. | 4              | 10             |
| " "     | Twenty-five Shares  | 4,250    | Doct. W. Phillips. [SEAL.] | do.               | 5              | 10             |
| " 27    | Five Hundred Shares | 25,000   | Wm. H. Boyd. [SEAL.]       | Cleveland.        | 6              | 14             |
| " "     | Fifty Shares        | 2,500    | William Merrill. [SEAL.]   | Medison, N. Y.    | 7              | 6              |
|         |                     | \$50,000 |                            |                   |                |                |

In witness to the foregoing subscriptions and signatures, we have hereunto set our } G. B. Dunton, [SEAL.]  
hands and seals, in the city of Cleveland, this 1st day of March, 1883. { Chas. Powell. [SEAL.]

No. 375.

300 SHARES.

# LEBANON MINING COMPANY

MISSOURI

OF LEBANON,



SHARES \$30 EACH.

This Certifies that **HIRAM MERRELL** is entitled to  
 Three Hundred Shares in the Capital Stock of the  
**LEBANON MINING COMPANY,**

Transferable only on the Books of the Company, in person or by Attorney, upon the surrender of this Certificate.

In Witness Whereof, the Seal of said Company is hereunto affixed.

Lebanon, April 2d, 1882.

P. Q. Ralston, Treas'r.

W. I. Wallace, Pres't.

CAPITAL STOCK,  
 \$500,000.



**THE PHILADELPHIA & READING RAILROAD COMPANY**

**== The Philadelphia & Reading Railroad Company ==**

**HEREBY CERTIFY**  
**STATE OF PENNSYLVANIA.**  
**IN WITNESS WHEREOF, I have hereunto set my hand and the Seal of the said Commonwealth, at Philadelphia, this 12th day of January, 1880.**



**\$100**  
 One of \$100.00

Herby acknowledge itself indebted to ROBERT B. CABEEN, or bearer, in the sum of ONE HUNDRED DOLLARS, lawful money of the United States of America; which sum it promises to pay in Philadelphia, to the said ROBERT B. CABEEN, or bearer, on the first day of January in the year of our Lord One Thousand Eight Hundred and Ninety-three (1893), with interest at the rate of seven per cent, per annum, free of all United States, State, or Municipal taxes; payable semi-annually, upon the first day of January and July in each year, upon the delivery of the annexed Coupons therefor. After the first day of July, Eighteen Hundred and Ninety-six, and at any time before the first day of January, Eighteen Hundred and Ninety-two, the holder of the Bond will be entitled to convert the principal sum thereof into the Capital Stock of the Company at par, upon surrendering the Bonds with all the Coupons not then due annexed. Provided, that such conversion shall only be made in any interest of time between the date of the payment of a dividend upon the Stock of the Company and the date of the maturity of the Coupon first falling due after the payment of said dividend, including both of said dates.

**In Witness Whereof, The said Company has hereunto offered its Corporate Seal, attested by the signatures of its President and Secretary, this first day of January, Anno Domini Eighteen Hundred and Seventy-three.**

**D. J. Brown, Secretary.**

**G. W. Bowen, President.**

PHILADELPHIA & READING RAILROAD CO.  
 Interest Warrant on Bond No. 12,567.  
 THREE HUNDRED DOLLARS.  
 Payable without deduction for taxes at the Office of the Company in the city of Philadelphia, Jan. 1, 1890.  
 \$3.50 D. J. BROWN, Sec'y.

PHILADELPHIA & READING RAILROAD CO.  
 Interest Warrant on Bond No. 12,567.  
 THREE HUNDRED DOLLARS.  
 Payable without deduction for taxes at the Office of the Company in the city of Philadelphia, July 1, 1890.  
 \$3.50 D. J. BROWN, Sec'y.

PHILADELPHIA & READING RAILROAD CO.  
 Interest Warrant on Bond No. 12,567.  
 THREE HUNDRED DOLLARS.  
 Payable without deduction for taxes at the Office of the Company in the city of Philadelphia, Jan. 1, 1890.  
 \$3.50 D. J. BROWN, Sec'y.

PHILADELPHIA & READING RAILROAD CO.  
 Interest Warrant on Bond No. 12,567.  
 THREE HUNDRED DOLLARS.  
 Payable without deduction for taxes at the Office of the Company in the city of Philadelphia, July 1, 1890.  
 \$3.50 D. J. BROWN, Sec'y.

## United States Currency Bond.

|                                                                                       |                                                                                                       |                                        |
|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----------------------------------------|
| Register's Office.                                                                    | KANSAS PACIFIC RAILWAY COMPANY.<br>(LATE UNION PACIFIC RAILWAY, EASTERN DIVISION.)                    | Treasury Department.                   |
| <p>1000</p> <p>It is hereby</p> <p>1000</p>                                           | <p>Certified that</p> <p>1000</p>                                                                     | <p>Act July 2, 1864.</p>               |
| <p>Act July 1, 1862.</p>                                                              | <p>United States</p>                                                                                  | <p>Act July 2, 1864.</p>               |
| <p>Are indebted unto <i>S. C. Patterson,</i> ..... or Assigns,</p>                    |                                                                                                       |                                        |
| <p>in the sum of <i>One Thousand Dollars</i> payable on the</p>                       |                                                                                                       |                                        |
| <p>first day of January, 1897, with Interest from the first day of January, 1879,</p> |                                                                                                       |                                        |
| <p>Six per cent. per annum, payable semi-annually, in lawful money, on the</p>        |                                                                                                       |                                        |
| <p>first day of January and July in each year. This debt is authorized by Act</p>     |                                                                                                       |                                        |
| <p>of Congress, approved July 1st, 1862, and July 2d, 1864, and is transfer-</p>      |                                                                                                       |                                        |
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